

EXHIBIT 24



LG.Philips Displays

Annual Report 2004

For the year ended December 31, 2004

LG.Philips Displays Holding B.V.

**LG.Philips Displays
Annual Report 2004**



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Selected Financial and Operating Data

Financial Highlights

amounts in USD million

Operating Results	Notes	2004	2003	2002
Net sales		\$ 4,047	\$ 3,966	\$ 4,402
Earnings before interest, tax, depreciation and amortization ("Adjusted EBITDA")	a	400	254	352
% of sales		9.9%	6.4%	8.0%
Income from operations before restructuring and impairment costs	b	285	122	165
Depreciation and amortization		(233)	(310)	(301)
Restructuring costs - impairment loss		(209)	(764)	(456)
Restructuring costs - cash outlay	c	(118)	(178)	(114)
Net loss		(171)	(872)	(532)
% of sales		-4.2%	-22.0%	-12.1%
Net capital expenditure	d	(104)	(162)	(382)
Financial position, year end		2004	2003	2002
Total Assets		\$ 2,991	\$ 3,422	\$ 4,349
Total Debt		(1,277)	(2,097)	(2,075)
Stockholders' (Equity)/ Deficit		(291)	65	(816)
Key ratios, year end				
Total debt to total stockholders' (equity)/ deficit		4.4	-32.3	2.5
Total debt to Adjusted EBITDA	e	3.19	8.26	5.89
Interest coverage ratio	f	4.21	2.54	3.03
Number of employees at year end		22,376	26,888	30,330

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**Notes:**

Financial measures (a) to (f) are non US GAAP measures as follows:

a. Use of Adjusted EBITDA

LG.Philips Displays ("LPD") evaluates operating performance based on several factors, including its primary financial measure of operating income/ (loss) before non-cash depreciation of tangible assets, amortization of intangible assets and impairment write-downs related to tangible assets, goodwill and intangible assets ("Adjusted EBITDA"). LPD considers Adjusted EBITDA to be an important indicator of the operational strength and performance of its businesses, including the ability to provide cash flows to service debt and fund capital expenditures. In addition, Adjusted EBITDA eliminates the uneven effect across all business segments of considerable amounts of non-cash depreciation of tangible assets and amortization of intangible assets. However, Adjusted EBITDA should be considered in addition to, not as a substitute for, operating income/ (loss), net income/ (loss) and other measures of financial performance reported in accordance with accounting principles generally accepted in the United States of America.

	2004	2003	2002
Loss from operations	(42)	(820)	(405)
Add: Depreciation expenses	222	294	290
Amortization expenses	11	16	11
Impairment loss	209	764	456
Adjusted EBITDA	400	254	352

b. "Income from operations before restructuring and impairment costs" is calculated by excluding restructuring and impairment costs charged.

	2004	2003	2002
Loss from operations	(42)	(820)	(405)
ADD: Restructuring and impairment costs	327	942	570
Income from operations before restructuring and impairment costs	285	122	165

c. "Restructuring costs - cash outlay" includes all costs incurred in respect of restructuring programs, for example, staff lay-off expenses and excludes charges in respect of asset impairment and write-offs.

d. Net capital expenditure is the total amount of purchases less sales proceeds of capital assets.

e. Total debt to Adjusted EBITDA is determined by dividing total debt by Adjusted EBITDA.

f. Interest coverage ratio is calculated as Adjusted EBITDA divided by net interest expense (including capitalized interest) plus amortized deferred finance costs.



Message from the President and Chief Executive Officer

To our Customers and Stakeholders,



In 2004, LG.Philips Displays prevailed once more as the world leader in the cathode ray tube (CRT) business. We have continued to gain strength in a mature and consolidating industry even as severe price erosion and intense competition persist in making conditions difficult.

We are constantly seeking ways to improve our operations. The market situation is forcing us to critically evaluate all our worldwide operations and concentrate capacities at the most competitive locations. Our customers' requirements are a key element of this process. We are adapting to changing market conditions on an ongoing basis.

In spite of a persistently difficult market, we have continued to generate profit from operations before restructuring and impairment costs, achieve strong cash flow, widen our market share and improve cost efficiency.

Highest growth

As a result of all our initiatives, our 2004 income from operations (before restructuring and impairment) increased 134 percent to USD285 million from USD122 million in the previous year. This is our highest growth and biggest annual profit (before restructuring costs) since our joint venture began in 2001.

Our sales revenue rose to USD4,047 million from USD3,966 million in 2003. This mainly consisted of USD2,870 million for color picture tubes (CPT), up from USD2,862 million in 2003, and USD1,027 million for color display tubes (CDT), up from USD969 million a year ago.

We have expanded our market share to an overall 28 percent, cornering 26 percent of the CPT market and 35 percent of the CDT sales.

After a negative cash flow in 2002, we have achieved positive cash flow (before financing) position in the last two years.



Industry situation

In the displays industry, stiff competition has led to further erosion of prices. Aside from the challenge posed by other CRT makers, we also have to contend with the aggressive inroads made by emerging technologies such as liquid crystal display (LCD) and plasma display panel (PDP).

Fortunately, 2004 was a favorable year for LG.Philips Displays. The CPT market continued to grow, boosted by events such as the Olympics and European Soccer Championships, while the CDT market did not have the strong decline that we had anticipated. LCD screen penetration was shifting towards the TV market, and as such, CDT sales remained strong in both volume and prices.

Dominant technology

We believe CRT will remain the dominant technology in the TV market in the foreseeable future. Supported by over 100 years of manufacturing experience, CRT is still the best display technology for your money: It offers the best performance at the lowest costs.

Today, only about 9 percent of TV customers can afford a TV priced at above US\$1,000 and only 11 percent actually spend about US\$1,000 for a TV set. About 20 percent buy TVs costing US\$500 and the majority of the remaining 60 percent buy TVs costing about US\$250 per unit. This bodes well for our CRT business.

In 2004, about 90 percent of TVs sold were CRT-based.

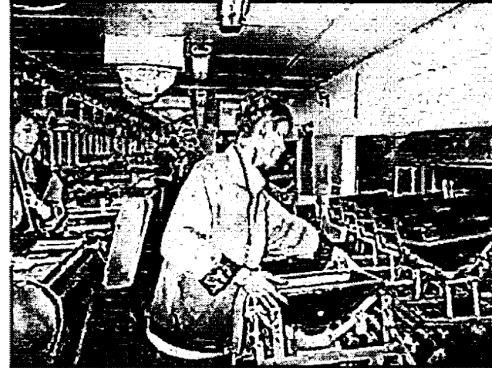
There is no doubt that LCD technology will continue to gain market share. Its market penetration has come in so-called "crystal cycles," where every time new LCD factories come on line, LCD monitor prices decline strongly. This means that over time, it will progressively eat into the CRT market share.

But for the moment, while LCD is boosting its presence in developed countries, CRT has enjoyed robust demand in emerging markets such as China, India and Russia. We have also grown strongly in Southeast Asia, Latin America and Eastern Europe.

**Upbeat on emerging markets**

Emerging markets represent 60 percent of the global demand for television displays in terms of volume. Together with the high-volume segments of advanced countries, demand for CPT will remain dominant globally in the coming years.

China, in particular, offers bright prospects for our business. It is already the largest CPT market place and will continue to grow. As estimated, its total CPT demand will soar from 53 million units in 2003 to approximately 60 million units by 2006, or a growth of over 13 percent in only three years. It should also be noted that as Beijing prepares to host the Olympic Games in 2008, CRT demand and sales will further expand because of the technology's picture performance and competitive price.



To serve growing market, we have increased our production capacity in our China factories and broadened our product portfolio with new and advanced products to meet the local demand.

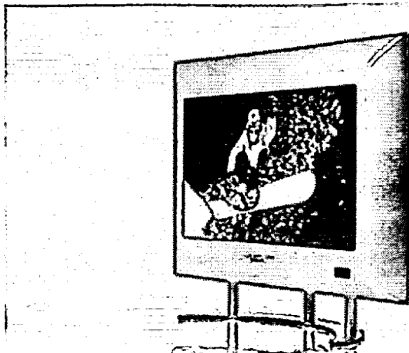
Leadership role

As the largest player in the CRT industry, LG.Philips Displays is conscious of its role of leading and supporting the business with cost-competitive and high-quality products.

We are committed to developing innovations that advance the field of CRT displays. Our innovations drive cost efficiencies and product performance. We meet the unique needs of local markets across the globe.



SuperSlim



One of the most exciting developments in the CRT technology is our development of the SuperSlim series. When we first showcased this breakthrough product at Internationale Funkausstellung (IFA) in Berlin, Germany, in 2003, it promptly drew much interest from industry participants and media because of the unique possibilities it offers to set makers and consumers alike.

We have practically reinvented the CPT with the SuperSlim tube. Measuring only 35 cm from front to back, it achieves up to 30 percent depth reduction compared to other CRT products in the market. This offers set makers considerable savings by reducing glass and weight, packaging materials and transport costs, while its excellent flat and stylish design will attract consumers who don't want to pay the high price tags of plasma and LCD TVs.

Following the successful production of 21" SuperSlim in Europe in December 2003, our Nanjing Plant in China started producing 21" Cybertube+ SuperSlim in early 2005, while the 32" Cybertube+ SuperSlim version started mass production in our Gumi factory in Korea.

A number of our customers have the SuperSlim tubes in TV sets now available to the public and many more TV makers have expressed keen interest in incorporating the SuperSlim tubes into their products and we are currently in discussions with them.

Restructuring

It cannot be overemphasized that in a mature and consolidating industry, only the strongest will survive. As such, we have taken the initiative to streamline our operations to make us more competitive and further strengthen our leadership position in the industry.

In 2004, we had to close down our CPT facility in Aachen, Germany, and our glass plant in Simonstone, UK, while we also had to reduce our CDT exposure Nanjing, China by partly converting production lines toward CPT. We further announced in December 2004 that we will close two lines in Dreux, France. These moves, though painful, are crucial to help us align our production capacity with market demand and maintain a worldwide cost-competitive position in the long term.

At the close of 2004, our staff stood at about 22,000, from 37,000 at the launch of the joint venture in 2001.

**Cost leadership**

Though we are still a young company, strong and decisive efforts must be taken at the earliest stage to reduce our costs to maintain and solidify our No. 1 position in the industry. Cost leadership is absolutely necessary to overcome the restructuring costs, offset the fast erosion of prices and keep the competition at bay.

OCOO Reduction

One of our key projects for the year was the OCOO Reduction Campaign. (OCOO refers to Other Costs of Organization, or costs incurred for utilities, repair and maintenance as well as other expenditures like IT and travel. OCOO is a major cost element in manufacturing, next only to cost of materials, along with other costs like salary and outsourcing, among others.)

Under this campaign, each plant in our global network was asked to challenge its own budget and bring down its OCOO percentage level.

The OCOO Reduction Campaign is a continuing endeavor in our aim of further reducing costs and strengthening our competitive position. It has further motivated everyone from top management to the shopfloor worker, who has become more aware of their role in minimizing waste and consumption, improving efficiency and simplifying work processes.

Foundation for turnaround

Since the launch of our joint venture, we have pursued different campaigns to address the challenges in a highly competitive industry. First there was One Team, in which the key project – Stop the Bleeding – sought to expedite the integration process as well as identify and resolve urgent issues. There was Best in Cost, which focused on cost reduction, and this was followed by the Make Money campaign, which aimed to establish the foundation for our company's turnaround.

Right from the start, we launched the Six Sigma initiative as a tool to improve manufacturing processes and financial results, and last year, we deployed Tear Down and Redesign for speedy and focused execution of core innovation tasks.

All these activities have generated welcome results, but as competition becomes more intense and conditions become more difficult, we need to push our creativity and determination to higher levels.



The New Game



At the beginning of 2005, we launched the New Game, which is our strategy to maintain our leadership in a rapidly changing and consolidating sector. The essence of the New Game was conveyed to our employees in different languages and approaches, and yet our goals are the same:

- ? To maintain No. 1 market share; and
- ? To create 2-digit IFO, along with a 2-digit cash flow%.

The key to executing the New Game is differentiation, which means setting ourselves apart from our competitors by keeping our competitive edge in terms of products, processes, innovation and organization.

This comprehensive strategy has been deployed in all factories and support offices of our global network, and being enthusiastically implemented by our dedicated management and staff.

We will win the New Game.

Challenges and opportunities

The year 2005 is bound to be a lot tougher than the previous one. The continued price erosion and the strengthening of the Euro and Korean Won against the US dollar will impact our business. In Europe, the CRT market is under increasing pressure from the aggressive penetration by flat display technologies.

Still, we remain confident that our cost-reduction and innovation activities will make us better prepared for the challenges ahead. Our management and staff are acutely aware of the realities of this business, but we have also realized that we have the ability to work together and the courage to reach our goals.

Jeong IL son
President and Chief Executive Officer

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Management Discussion

Management's Discussion on Results of Operations

Consolidated sales for the year-ended 2004 were USD4,047 million, 2.0% up from that of 2003. Excluding the effect of US dollars depreciation, sales remained stable yet still facing continuing CRT market contraction and price erosion due to the keen competition. The Group has maintained its leadership position in the CRT industry with a market share of 28% in volume terms, mainly due to an improvement in the sales mix of flat screen products and large screen sizes in growing markets like China, Brazil and India.

CPT demand in 2004 grew in volume terms with 4% , the Group has managed to retain 26% global market share in volume terms. Due to severe price erosions, our average sales prices resulted in USD66 per unit in 2004 versus USD69 per unit in 2003. Sales to parents, LG Electronics ("LGE") and Royal Philips Electronics ("Philips"), now make up about 35% of total CPT volume sales. Although the increased popularity of new technologies like LCD and plasma is noted, the Group expects CRT technology to remain the dominant TV display technology in the coming years primarily due to the products' competitive price to picture performance ratio. In 2005, the Group is aiming at extending its market share by deepening its customer penetration and positioning its flat-faced, slim and large screen products into new growth markets.

In contrast to the CPT market, the CDT market did not have the strong decline that we had anticipated. LCD screen penetration was shifting towards the TV market, and as such, CDT sales remained strong in both volume and prices. Average selling price remained USD44 per unit in 2004 which is the same level as 2003. Yet the Group managed to further increase its market share in volume terms from 31% last year to 35% this year on a global basis. Sales to LGE and Philips comprised about 54% of total CDT volume sales.

The Group achieved an EBITDA of 10% sales and made an operational profit before restructuring and impairment costs of USD285 million. To align the production capacity with market demand, the Group continued its restructuring plan, incurring restructuring costs and impairment charges of USD327 million. Non-cash related restructuring costs amount to USD209 million. Major impairment charges were made in Dreux (USD65 million), Barayo (USD50 million), Aachen Glass (USD34 million), Ottawa (USD15 million), and Namestovo (USD14 million). Net loss for the year was USD171 million.

The Group is strongly focusing on cash flow management. The cash flow before restructuring, after turning positive in 2003, increased further to a level of USD238 million in 2004.

As follow up to the successful Best-in-Class program last year, the Group had launched an ambitious cost reduction program, called Tear Down and Redesign (TDR) in the beginning of 2004. TDR is a learning mechanism designed to solve problems by creating knowledge synergy in cross-functional teams. Skills and expertise are developed, enabling a constant overachievement of targets.

The program will continue to run in full force during 2005, covering all areas of the Organization.



Management's Discussion of Financial Resources and Liquidity

In the second half of 2003, LG.Philips Displays breached certain covenants in the USD2 billion syndicated loan facility. Since then, the management of LG.Philips Displays had worked closely with its two shareholders, LGE and Philips to develop a detailed plan for the consensual restructuring of its USD2 billion syndicated loan facility. The discussions among LG.Philips Displays, its shareholders and the bank syndicate's Steering Committee resulted in a comprehensive Restructuring Agreement signed by all parties on June 25, 2004. The consensual restructuring became legally effective on July 14, 2004 after all required conditions precedent were successfully fulfilled.

Under the Restructuring Agreement, the two shareholders of LG.Philips Displays committed their joint support to the Group by injecting USD500 million new equity capital, reducing USD100 million working capital requirement and providing a USD100 million guarantee, replacing their former guarantees. With the equity injection proceeds from shareholders and cash generated from operation, LG.Philips Displays reduced the outstanding syndicated loan balance by USD710.5 million in 2004 of which USD40.5 million was prepaid for 2005, thus reducing the syndicated loan repayment obligation in 2005 to USD49.5 million.

The Restructuring Agreement allows LG.Philips Displays to retain adequate liquidity by extending the syndicated loan maturity to the end of 2010. In addition, LG.Philips Displays has already funded a USD50 million cash buffer for future syndicated loan repayment obligations. Since the Restructuring Agreement being in effect, LG.Philips Displays has been in full compliance with the newly agreed syndicated loan terms.

At the end of 2004, the Group has approximately USD256 million available and unused loan facilities in China and Korea.

Management's Discussion of Financial Responsibility

Management is responsible for the preparation, integrity and objectivity of the consolidated financial statements and other financial information presented in this report. The accompanying consolidated financial statements were prepared in accordance with generally accepted accounting principles in the United States of America, applying certain estimates and judgments as required.

LG.Philips Displays' internal controls are designed to provide reasonable assurance as to the integrity and reliability of the financial statements and to adequately safeguard, verify and maintain accountability of assets. Management is committed to maintaining and deploying these internal controls through written policies and procedures, implemented by trained, skilled personnel, with appropriate segregation of duties. A comprehensive internal audit program is in place to monitor and report on the adequacy of business internal controls. Employees are required to behave ethically and business practices throughout the world are to be conducted in a manner that is above reproach.



Independent Auditors' Report

To the Directors of LG.Philips Displays Holding BV

We have audited the accompanying consolidated balance sheet of LG.Philips Displays Holding B.V. and its subsidiaries ("the Group") as of December 31, 2004 and the related consolidated statements of operations, changes in stockholders' equity and comprehensive income and cash flows for the year then ended, set out on pages 13 to 63. These consolidated financial statements are the responsibility of the Group's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audit. This report is made solely to you, as a body, in accordance with our agreed terms of engagement, and for no other purpose. We do not assume responsibility towards or accept liability to any other person for the contents of this report.

We conducted our audit in accordance with International Standards on Auditing. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the consolidated financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Group as of December 31, 2004, and of the results of its operations and its cash flows for the year then ended in accordance with generally accepted accounting principles of the United States of America.

This report is intended solely for the information of the management and directors of LG.Philips Displays Holding B.V. and is not intended for any other purpose. This report may also be provided for the information of Koninklijke Philips Electronics N.V. and LG Electronics Inc. and their auditors. This report is not to be copied, quoted or referred to, in whole or in part, in any other connection without our prior written consent.

Hong Kong

April 15, 2005

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Consolidated Financial Statements

Consolidated Statements of Operations for the years ended December 31, 2004, 2003 and 2002

amounts in USD million

		2004	2003	2002
	Notes			
Sales		\$ 4,047	\$ 3,966	\$ 4,402
Direct cost of sales		(3,300)	(3,265)	(3,630)
Gross profit		\$ 747	\$ 701	\$ 772
Expenses				
Selling expenses		(129)	(127)	(143)
General and administrative expenses		(74)	(102)	(102)
Research and development expenses		(58)	(101)	(112)
Depreciation expenses		(222)	(294)	(290)
Amortization expenses		(11)	(16)	(11)
Other income, net	6	32	61	51
Restructuring and impairment costs	7	(327)	(942)	(570)
Loss from operations		\$ (42)	\$ (820)	\$ (405)
Financial expenses	8	(95)	(57)	(122)
Results related to unconsolidated companies		(5)	-	-
Loss before income taxes		\$ (142)	\$ (877)	\$ (527)
Income taxes	9	16	18	2
Loss after income taxes		\$ (126)	\$ (859)	\$ (525)
Minority interests		(45)	(13)	(2)
Net loss from continuing operations before cumulative effect of a change in accounting principle		\$ (171)	\$ (872)	\$ (527)
Cumulative effect of a change in accounting principle, net of income tax of USD Nil	10	-	-	(5)
Net loss		\$ (171)	\$ (872)	\$ (532)

See accompanying notes on pages 19 to 63, which form an integral part of these financial statements.

**Consolidated Balance Sheets at December 31, 2004 and 2003***amounts in USD million, except for share figures*


	Notes	2004	2003
ASSETS			
Current assets:			
Cash and cash equivalents	11	\$ 113	\$ 322
Accounts receivable, less allowance for doubtful accounts (USD13 million in 2004 and USD9 million in 2003)	12	389	445
Inventories	13	232	289
Amounts due from Parent companies	14	179	191
Tax refundable		14	16
Deferred tax assets	9	5	13
Other current assets	15	73	81
Total current assets		\$ 1,005	\$ 1,357
Non-current assets:			
Pledged deposits	11	50	-
Investment in unconsolidated companies	16	21	3
Other non-current financial assets	17	-	13
Other non-current assets	18	6	18
Deferred tax assets	9	36	17
Property, plant and equipment	19	1,591	1,724
Goodwill and intangible assets	21	282	290
Total non-current assets		\$ 1,986	\$ 2,065
TOTAL ASSETS		\$ 2,991	\$ 3,422
LIABILITIES AND STOCKHOLDERS' EQUITY			
Current liabilities:			
Accounts payable		\$ 677	\$ 674
Amounts due to Parent companies	14	66	86
Tax payable		1	5
Deferred tax liabilities	9	2	4
Provisions and other liabilities - current portion	22	336	311
Loans - current portion	23	200	1,654
Total current liabilities		\$ 1,282	\$ 2,734
Non-current liabilities:			
Provisions and other liabilities - non-current portion	22	103	91
Loans - long-term portion	23	1,077	443
Deferred tax liabilities	9	3	14
Total non-current liabilities		\$ 1,183	\$ 548
TOTAL LIABILITIES		\$ 2,465	\$ 3,282

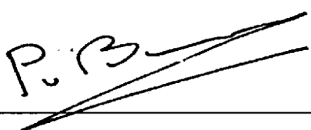
See accompanying notes on pages 19 to 63, which form an integral part of these financial statements.

**Consolidated Balance Sheets at December 31, 2004 and 2003 (continued),***amounts in USD million, except for share figures*

	2004	2003
Minority interests	235	205
Stockholders' equity/ (deficit):		
Common stock, par value EUR1 per share		
Authorized: 90,000 shares		
Issued and outstanding: 68,182 shares (2003: 68,182 shares)	-	-
Share premium	2,040	1,546
Accumulated losses	(1,926)	(1,752)
Accumulated other comprehensive income	177	141
Stockholders' equity/ (deficit)	\$ 291	\$ (65)
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	\$ 2,991	\$ 3,422

Approved and authorized for issue by the Company on April 15, 2005


 Jeong IL Son President and CEO


 Peter van Bommel Deputy CEO and Chief Financial Officer

See accompanying notes on pages 19 to 63, which form an integral part of these financial statements.



Consolidated Statements of Changes in Stockholders' Equity/ (Deficit) and Comprehensive Income/ (Loss) for the years ended December 31, 2004, 2003 and 2002

<i>amounts in USD million, except for share figures</i>	<i>Number of shares issued, EUR 1 par value per share</i>	<i>Common stock</i>	<i>Share premium</i>	<i>Accumulated losses</i>	<i>Accumulated other comprehensive income</i>	<i>Total Stockholders' equity/ (deficit)</i>
Balance at January 1, 2004						
As previously reported	68,182	-	1,546	(1,752)	141	(65)
Adjustment arising from acquisition of subsidiaries	-	-	-	(3)	-	(3)
As adjusted	68,182	-	1,546	(1,755)	141	(68)
Capital contribution on July 14, 2004 (net of capital duty of USD6 million)	-	-	494	-	-	494
Net loss for the year	-	-	-	(171)	-	(171)
Translation adjustments	-	-	-	-	36	36
Balance at December 31, 2004	68,182	-	2,040	(1,926)	177	291
Balance at January 1, 2003	68,182	-	1,546	(880)	150	816
Net loss for the year	-	-	-	(872)	-	(872)
Translation adjustments	-	-	-	-	(9)	(9)
Balance at December 31, 2003	68,182	-	1,546	(1,752)	141	(65)
Balance at January 1, 2002	49,998	-	1,296	(348)	22	970
Share capital issued on May 31, 2002	18,184	-	250	-	-	250
Net loss for the year	-	-	-	(532)	-	(532)
Translation adjustments	-	-	-	-	128	128
Balance at December 31, 2002	68,182	-	1,546	(880)	150	816

Note: Accumulated other comprehensive income mainly represented the currency translation differences. The comprehensive income/ (loss) was USD(135) million, USD(881) million and USD(404) million for the years ended December 31, 2004, 2003 and 2002 respectively.

See accompanying notes on pages 19 to 63, which form an integral part of these financial statements.



Consolidated Statements of Cash Flow for the years ended December 31, 2004, 2003 and 2002

amounts in USD million		Notes	2004	2003	2002
Net cash provided by operating activities			\$ 269	\$ 436	\$ 135
Cash flows – investing activities					
Additions to property, plant and equipment			(137)	(208)	(442)
Additions to intangible assets			(3)	(5)	(9)
Purchase of subsidiaries	29	(2)	-	-	-
Investment in unconsolidated companies	16	(19)	(3)	-	-
Purchase of available-for-sale securities			-	(17)	-
Sales proceeds in respect of property, plant and equipment			36	51	69
Sales proceeds in respect of available-for-sale securities			18	-	-
Sales proceeds in respect of interest in business	25	-	21	-	-
Proceeds from sales of shares in a subsidiary to parent companies			-	2	-
Net cash used in investing activities			\$ (107)	\$ (159)	\$ (382)
Cash flows - financing activities					
Net (decrease)/ increase in short-term debt			(103)	300	(260)
Proceeds from issuance of long-term debt			29	37	431
Repayment of long-term debt			(746)	(360)	(446)
Payment of debt issuance costs			-	-	(2)
Proceeds from issuance of share capital to minority shareholders			-	4	13
Dividend paid to minority shareholders			(15)	(11)	(2)
Proceeds from capital contribution			500	-	-
Payment of capital duty related to previous and current years' capital contribution			(6)	-	-
Proceeds from issuance of common stock			-	-	250
Net cash used in financing activities			\$ (341)	\$ (30)	\$ (16)
Net change in cash and cash equivalents			(179)	247	(263)
Effect of exchange rate changes			(30)	(50)	6
Cash and cash equivalents at beginning of year			322	125	382
CASH AND CASH EQUIVALENTS AT END OF YEAR			\$ 113	\$ 322	\$ 125

Net cash paid during the year for:

	2004	2003	2002
Interest paid	77	86	100
Income taxes	20	7	29

See accompanying notes on pages 19 to 63, which form an integral part of these financial statements.



Consolidated Statements of Cash Flow for the years ended December 31, 2004, 2003 and 2002 (continued)

amounts in USD million

CASH FLOW - operating activities	2004	2003	2002
Net loss	\$ (171)	\$ (872)	\$ (532)
Adjustments to reconcile net loss to cash provided by operating activities:			
Depreciation	\$ 222	\$ 294	\$ 290
Impairment loss on property, plant and equipment	159	675	456
Impairment loss on goodwill	-	89	5
Amortization and write off of intangibles assets	11	16	11
Net (gain)/ loss on disposal and write off of property, plant and equipment	(11)	1	(1)
Provision for losses on available-for-sale securities	-	4	-
Gain on sale of interests in subsidiaries	-	(36)	-
Loss on acquisition of subsidiaries	50	-	-
Gain on sale of available-for-sale securities	(5)	-	-
Loss from unconsolidated companies	5	-	-
Minority interests	45	13	2
Increase in pledged deposits	(50)	-	-
Decrease/ (increase) in accounts receivable	67	78	(160)
Decrease in inventories	63	57	70
Net increase in amount due (to)/ from parent companies	(8)	111	(86)
Decrease/ (increase) in other current assets	18	27	(19)
(Decrease)/ increase in accounts payable	(43)	(179)	205
(Decrease)/ increase in provisions and other liabilities	(79)	128	(70)
(Increase)/ decrease in non-current assets	(5)	34	(17)
Increase/ (decrease) in non-current liabilities	1	(4)	(19)
Net cash provided by operating activities	\$ 269	\$ 436	\$ 135

See accompanying notes on pages 19 to 63, which form an integral part of these financial statements.



Notes to the Consolidated Financial Statements

1. Description of business

The principal activity of LG.Philips Displays Holding BV ("the Company") and its subsidiaries (collectively "the Group") is the manufacture and sale of cathode ray tubes ("CRT") for use in television sets and computer monitors. The Group has a number of factories worldwide and serves global customers across many regions. Asia Pacific represents the Group's major geographical market segment. The sales mix in 2004 was represented at 71% (2003: 72%) in respect of Color Picture Tubes ("CPT") for television sets, 25% (2003: 25%) in respect of Color Display Tubes ("CDT") for computer monitors and 4% (2002: 3%) in related components ("Comp"). Approximately 44% (2003: 43%) of the Group's sales during 2004 were derived from sales to the Company's parent companies.

Royal Philips Electronics ("Philips") and LG Electronics Inc. ("LGE") (collectively "the Group's Parents" or the "Company's Shareholders") entered into a Joint Venture Agreement dated June 11, 2001 ("JV Agreement"). Pursuant to the JV Agreement, LGE and Philips transferred to the Company the assets and liabilities of their respective businesses engaged in the manufacture and sale of (i) CDT and CPT – collectively CRT; (ii) deflection yokes, electron guns and electron gun parts for use with CRT only ("Initial CRT Components") and (iii) CRT glass ("CRT Glass") and other key CRT components and materials (collectively such businesses are referred to as "CRT Business"). Under the terms of the JV Agreement, the closing of the acquisition by the Group of the CRT Businesses of Philips and LGE was effective as of June 30, 2001.

2. Basis of presentation

The accompanying consolidated financial statements present the operations of the Company and its subsidiaries and have been prepared in accordance with generally accepted accounting principles in the United States of America (U.S. GAAP).

3. Going concern

On June 25, 2004, the Group reached agreement with the lenders in the bank syndicate on a restructuring of the Group's syndicated loan in respect of which USD1,433 million was outstanding as of January 1, 2004, and of which USD100 million was repaid in January 2004. The restructuring, effective as of July 14, 2004, includes revised loan covenants, a waiver of previous breaches of loan covenants, which could have resulted in the syndicated loan becoming immediately repayable in full had two thirds of the syndicate so elected, a revised repayment schedule of amounts due under the syndicated loan, an extensive security package to secure the syndicate loan repayment obligation and additional equity of USD500 million provided by the Company's Shareholders to reduce part of the outstanding debt. The USD500 million equity contributions and repayment of the same amount of outstanding debt were completed in July 2004.

Under the revised syndicated loan agreement and as noted above, the Group is now subject to revised covenants, namely a debt service ratio, a maximum debt level and a maximum amount of permitted cash restructuring costs, as part of the restructuring of the syndicated loan and the Group has been in compliance with these covenants since the restructuring of the syndicated loan was completed. Management of the Group has assessed the Group's ability to adhere to these revised covenants and expects that such covenants shall be adhered to for the foreseeable future.



The Group operates in a mature business that has encountered significant reductions in prices and increasing competition from newer technologies. In assessing the Group's ability to adhere to such covenants, management's estimate of future cash flows has taken account of management's expectations of industry trends and market decline in assessing the Group's ability to generate sufficient cash flows from operations to repay outstanding amounts, to meet ongoing loan covenants and to continue as a going concern. The future pace of market decline is uncertain and should such take place more rapidly than management currently expects, this could have negative implications on the Group's ability to repay loans and adhere to covenants. However, management is satisfied that the assumptions underlying such estimate are appropriate and that they have been made after due and careful analysis.

Total bank and other loans (including amounts outstanding in respect of a Floating Rate Note ("FRN") amounting to EUR200 million) amounted to USD1,277 million as at December 31, 2004 and cash balances at that date amounted to USD113 million.

Under the terms of the FRN, the Group is required to repay the amount by June 2007. Management has identified that the repayment of such FRN may need to be re-financed by additional sources of funds. The Group is satisfied that such repayment will be satisfactorily addressed in sufficient time to enable the FRN to be repaid or refinanced by the due date.

Management is satisfied that based on its assessment of the Group's expected future operations, the Group will be able to meet its debts as they fall due and to adhere to loan covenant requirements. Accordingly, the financial statements have been prepared on a going concern basis.

4. Step-up accounting

Each of the Group's Parents, LGE and Philips, contributed assets to the Company in exchange for their interest in the Group, together with cash payments by the Group to the Parents calculated by reference to differences between historical cost and valuations of certain businesses (being LGE's CRT Business and Philips' Glass Business) contributed to the Group by LGE and Philips. The values were determined by LGE and Philips, based on a number of factors including investment banks' valuations, cash flow projections, negotiations between the Group's Parents, and as set out in the JV Agreement.

Based on the amounts of net assets contributed by LGE and Philips and cash paid to LGE and Philips, assets contributed by LGE have been recorded at the book values that were contributed by LGE plus a partial step up of 17.74% of the fair value increment, and net assets contributed by Philips in respect of Philips' Glass Business have been recorded at 100% of the fair value; such fair values having been determined by management and such accounting treatment is referred to as step-up accounting.

Based on the foregoing step-up accounting basis, the total amount of step-up increment recorded by the Group at the opening balance sheet date of June 30, 2001 was USD465 million, which was allocated by management to property, plant and equipment in the amount of USD30 million, to intellectual property rights ("IPR") in the amount of USD71 million and to goodwill in the amount of USD364 million. The revaluation adjustment relating to property, plant and equipment is depreciated over the expected remaining useful lives of the respective assets, the value allocated to IPR is amortized over the expected useful lives of the related rights and during the period ended December 31, 2001, goodwill was amortized over 5 years. For financial periods commencing on or after January 1, 2002, the Group has adopted Statements of Financial Accounting Standards ("SFAS") No. 142, *Goodwill and Other Intangible Assets*, which requires allocation of goodwill to reporting units and impairment review in lieu of amortization of goodwill.

5. Accounting policies

Basis of consolidation

The accompanying consolidated financial statements include the financial statements of the Company and its subsidiaries in which the Company has a controlling financial interest. All material intra-Group transactions and balances have been eliminated on consolidation.



The result is reduced by the portion of the results of subsidiaries applicable to minority interests. The minority interests are disclosed separately in the consolidated statements of operations and in the consolidated balance sheets.

Investment in unconsolidated companies

Investment in companies in which the Group does not have the ability to directly or indirectly control the financial and operating decisions, but does possess the ability to exert significant influence, are accounted for using the equity method. Generally, in the absence of demonstrable proof of significant influence, it can be presumed to exist when the Group owns between 20% and 50% of the investee's voting stock. Under the equity method, only the Group's investment in and amounts due to and from the equity investee are included in the consolidated balance sheet; only the Group's share of the investee's earnings is included in the consolidated operating results; and only the dividends, cash distributions, loans or other cash received from the investee, additional cash investments, loan repayments or other cash paid to the investee, are included in the consolidated cash flows. The Group recognizes an impairment loss when an other-than-temporary decline in the value of the investment occurs.

Equity investment in companies in which the Group does not have a controlling interest, or an ownership and voting interest so large as to exert significant influence, are accounted for at market value if the investments are publicly traded. If the equity investment is not publicly traded, then the investment is accounted for at cost. The Group recognizes an impairment loss when an other-than-temporary decline in the value of an equity investment occurs.

In determining whether impairment is other-than-temporary, the Group considers whether it has the ability and intent to hold the investment for a reasonable period of time sufficient for a forecasted recovery of fair value up to (or beyond) the cost of investment and considers whether evidence indicating the cost of investment is recoverable within a reasonable period of time outweighs evidence to the contrary. Evidence considered in the assessment includes the cause of the decline, the severity and duration of the decline, changes in value subsequent to year-end and forecast performance of the investment.

Foreign currency transactions

The reporting and functional currency adopted by the Group is the US dollar. The functional currency of foreign enterprises or subsidiaries is generally the local currency, unless the primary economic environment requires the use of another currency.

Gains and losses arising from the translation or settlement of foreign-currency-denominated monetary assets and liabilities into the local currency are recognized in income in the period in which they arise. However, currency differences on intercompany loans that have the nature of a permanent investment are accounted for as translation differences as a separate component of other accumulated comprehensive income (loss) within stockholders' equity.

The balance sheet items of foreign enterprises or subsidiaries are translated into US dollars at the rates of exchange prevailing at the balance sheet date. The results of foreign enterprises are translated into US dollars using the average rate for the year/period. The resulting exchange differences are reflected in the other comprehensive income component within stockholders' equity. Cumulative translation adjustments are recognized as income or expense upon disposal or liquidation of a foreign subsidiary.



Derivative financial instruments

The Group uses derivative financial instruments principally in the management of its foreign currency risks and to a more limited extent for commodity price risks. In applying SFAS No. 133, *Accounting for Derivative Instruments and Hedging Activities*, SFAS No. 138, *Accounting for Certain Derivative Instruments and Certain Hedging Activities*, and SFAS No. 149, *Amendment of Statement 133 on Derivative Instruments and Hedging Activities*, which was adopted in 2003, the Group measures all derivative financial instruments based on fair values derived from market prices of the instruments. Gains or losses arising from changes in the fair value of the instruments are recognized in the statement of operations during the period in which they arise to the extent that the derivatives have been designated as a hedge of recognized assets or liabilities, or to the extent that the derivatives have no hedging designation or are ineffective. The gains and losses on the designated derivatives substantially offset the changes in the values of the recognized hedged items, which are also recognized as gains and losses in the statement of operations.

Changes in the fair value of a derivative that is highly effective and that is designated and qualifies as a fair value hedge, along with the loss or gain on the hedged asset or liability or unrecognized firm commitment of the hedged item that is attributable to the hedged risk, are recorded in the statement of operations.

Changes in the fair value, resulting from the risk being hedged, of a derivative that is highly effective and that is designated and qualifies as a cash flow hedge, are recorded in accumulated other comprehensive income, until earnings are affected by the variability in cash flows of the designated hedged item. Changes in the fair value of a derivative that are highly effective as hedges and that are designated and qualify as foreign currency hedges are recorded in either earnings or accumulated other comprehensive income, depending on whether the hedge transaction is a fair value hedge or a cash flow hedge.

The Group formally assesses, both at the hedge's inception and on an ongoing basis, whether the derivatives that are used in hedging transactions are highly effective in offsetting changes in cash flows of hedged items.

The Group discontinues hedge accounting prospectively when it is determined that the derivative is no longer effective in offsetting changes in the fair value or cash flows of the hedged item, the derivative expires or is sold, terminated, or exercised, the derivative is undesignated as a hedging instrument, because it is unlikely that a forecasted transaction will occur, a hedged firm commitment no longer meets the definition of a firm commitment, or management determines that designation of the derivative as a hedging instrument is no longer appropriate.

When hedge accounting is discontinued because it is determined that the derivative no longer qualifies as an effective fair-value hedge, the Group continues to carry the derivative on the balance sheet as its fair value and no longer adjusts the hedged asset or liability for changes in fair value. The adjustment of the carrying amount of the hedged asset or liability is accounted for in the same manner as other components of the carrying amount of that asset or liability. When hedge accounting is discontinued because the hedged item no longer meets the definition of a firm commitment, the Group continues to carry the derivative on the balance sheet at its fair value, removes any asset or liability that was recorded pursuant to recognition of the firm commitment from the balance sheet, and recognizes any gain or loss in earnings. When hedge accounting is discontinued because it is probable that a forecasted transaction will not occur, the Group continues to carry the derivative on the balance sheet at its fair value with subsequent changes in fair value included in earnings, and gains and losses that were accumulated in other comprehensive income are recognized immediately in earnings. In all other situations in which hedge accounting is discontinued, the Group continues to carry the derivative at its fair value on the balance sheet and recognizes any subsequent changes in its fair value in earnings.



Interest costs

Interest costs are expensed in the statement of operations in the period in which they are incurred, except to the extent that they are capitalized as being directly attributable to the acquisition, construction or production of an asset which necessarily takes a substantial period of time to get ready for its intended use or sale.

The capitalization of interest costs as part of the cost of a qualifying asset commences when expenditures for the asset are being incurred, interest costs are being incurred and activities that are necessary to prepare the asset for its intended use or sale are in progress. Capitalization of interest costs is suspended or ceases when substantially all the activities necessary to prepare the qualifying asset for its intended use or sale are interrupted or complete.

Cash and cash equivalents

Cash equivalents include all cash balances and short-term highly liquid investments with an original maturity of three months or less that are readily convertible into known amounts of cash. For the purpose of the consolidated statements of cash flows, the Group considers all highly liquid debt instruments with original maturities of three months or less to be cash equivalents.

Trade accounts receivable

Trade accounts receivable are recorded at the invoiced amount and do not bear interest. The allowance for doubtful accounts is the Group's best estimate of the amount of probable credit losses in the Group's existing accounts receivable. The Group reviews its allowance for doubtful accounts regularly.

The allowance for the risk of non-collection of trade accounts receivable is determined in three stages. First, significant individual debtors are assessed for creditworthiness based on external and internal sources of information; management decides upon an allowance based on that information and the specific circumstances for that debtor which might require a value allowance. In the second stage, for all other debtors the allowance is calculated based on a percentage of average historical losses. Finally, if, owing to specific circumstances such as serious adverse economic conditions in a specific country or region, it is management's judgment that the valuation of the receivables is inadequately represented by the valuation allowance in stage two, the percentage of valuation allowance for the debtors in the related country or region may be increased to cover the increased risk.

Investments

The Group classifies its investments in debt securities as available-for-sale. Unrealized holding gains and losses, net of the related tax effect, on available-for-sale securities are excluded from earnings and are reported as a separate component of other accumulated comprehensive income within stockholders' equity until realized, at which time the realized gain or loss is included in income.

A decline in the market value of any available-for-sale security below cost that is deemed to be other than temporary results in a reduction in the carrying amount to fair value. The impairment is charged to earnings and a new cost basis for the security is established. Interest income is recognized when earned. Realized gains or losses, if any, are recorded in financial income and expenses.

Other non-current assets

Loans receivable are stated at amortized cost, less an allowance for impaired loans. Management considers a loan to be impaired when it is probable that the Group will be unable to collect all amounts due according to the contractual terms of the loan agreement. When a loan is considered to be impaired, the amount of the impairment is measured based on the present value of expected future cash flows discounted at the loan's effective interest rate. Impairment losses are included in the allowance for doubtful accounts through a charge to bad debt expense.



Inventories

Inventories are stated at the lower of cost or market value. Inventory cost is determined predominantly using the first in first out method (FIFO). A small number of locations use the average cost basis, however, this is not significantly different from FIFO.

The cost of inventories comprises all costs of purchase, cost of conversion and other costs incurred to bring the inventories to their present location and condition. The costs of conversion of inventories include direct labor, fixed and variable production overheads and variable production cost, taking into account the stage of completion of the inventories.

Provision is made for estimated losses due to obsolescence based on management's best estimates.

Property, plant and equipment

Property, plant and equipment are stated at cost (plus step-up increment, where applicable) less accumulated depreciation and impairment. Plant and equipment under capital leases are initially recorded at the present value of minimum lease payments. These leased assets are amortized over the shorter of the lease term or the economic life of the property, plant and equipment. Assets constructed by the Group include direct manufacturing costs, production overheads and interest charges incurred during the construction period. Government grants are deducted from the cost of the related assets. The expenditure on assets under construction is recorded first in "Construction in progress" and then transferred to the appropriate asset account on completion. Depreciation is recorded using a straight-line method, based on the useful lives of the assets.

The principal depreciation rates used for this purpose are as follows:

• Land	no depreciation
• Buildings	20 - 50 years
• Machinery	3 - 20 years
• Other equipment	5 - 20 years

Gains and losses on the sale of property, plant and equipment are included in 'other income' in the statement of operations.

Maintenance and repairs are charged to the statement of operations; replacements and improvements to property, plant and equipment are capitalized and depreciated over the estimated useful lives of such assets.

Asset retirement obligations

In June 2001, the FASB issued SFAS No.143, 'Accounting for Asset Retirement Obligations'. The Group adopted this Statement in 2003. Under the provisions of this Statement, the Group recognizes the fair value of an asset retirement obligation in the period in which it is incurred, while an equal amount is capitalized as part of the carrying amount of the long-lived asset and subsequently depreciated over the life of the asset. Upon initial application of the Statement, the Group recognized a liability for existing asset retirement obligations adjusted for cumulative accretion to January 1, 2003. Additionally, the Group recorded the asset retirement cost as an increase to the carrying amounts of the associated long-lived assets and recognized the accumulated depreciation on such capitalized cost. The cumulative effect of the initial application of the Statement has been reported in the operating result for 2003, rather than recognized as a change in accounting principle, as the amount of asset retirement obligation was less than USD0.7 million which was not material.



Goodwill

The Group adopted the provisions of SFAS No. 142, *Goodwill and Other Intangible Assets*, as of January 1, 2002. Consequently, goodwill is no longer amortized but instead tested for impairment annually or whenever impairment indicators so require. Prior to the adoption of SFAS No. 142, the Group applied the straight-line method for amortization of goodwill over the period expected to benefit of 5 years.

Upon adoption of SFAS No. 142 the Group was required to evaluate its existing intangible assets and goodwill that were acquired in purchase business combinations, and to make any necessary reclassifications in order to conform with the new classification criteria in SFAS No. 141 for recognition separate from goodwill. The Group reassessed the useful lives and residual values of all intangible assets acquired. In connection with SFAS No. 142's transitional goodwill impairment evaluation, this Statement required the Group to perform an assessment of whether there was an indication that goodwill was impaired as of the date of adoption. To accomplish this, the Group was required to identify its reporting units and determine the carrying value of each reporting unit by assigning the assets and liabilities, including the existing goodwill and intangible assets, to those reporting units as of January 1, 2002. Furthermore, the Group was required to determine the fair value of each reporting unit and to compare it to the carrying amount of the reporting unit. To the extent the carrying amount of a reporting unit exceeded the fair value of the reporting unit, the Group was required to perform the second step of the transitional impairment test. In the second step, the Group was required to compare the implied fair value of the reporting unit goodwill with the carrying amount of the reporting unit goodwill, both of which were measured as of the date of adoption of SFAS No. 142. The implied fair value of goodwill is determined by allocating the fair value of the reporting unit to all of the assets (recognized and unrecognized) and liabilities of the reporting unit in a manner similar to a purchase price allocation, in accordance with SFAS No. 141. The residual fair value after this allocation was the implied fair value of the reporting unit goodwill.

The Group identified its reporting units and performed the transitional goodwill impairment test for each of those reporting units in the first quarter of 2002. An impairment loss of USD5 million was included in the statement of operations as a cumulative effect of a change in accounting principle as a consequence of the transitional impairment test.

Fair value of the reporting units is determined using expected discounted future cash flows. Determining cash flows requires the use of judgements and estimates that reflect the Group's strategic plans and long-range forecasts. The data necessary for the impairment tests are based on management estimates of future cash flows, which require estimating revenue growth rates and profit margins.

Intangible assets other than goodwill

Intangible assets with estimable useful lives are amortized using the straight-line method over their respective estimated useful lives to their estimated residual values, and reviewed for impairment in accordance with SFAS No. 144, *Accounting for the Impairment or Disposal of Long-Lived Assets*. There are currently no intangible assets with indefinite lives.

Certain costs relating to the development and purchase of software for internal use are capitalized and subsequently amortized over the estimated useful life of the software and the amortization charge for 2004 was USD3 million (2003: USD4 million, 2002: USD2 million).

Research and development

All costs of research and development are expensed in the period in which they are incurred.

Shipping and handling

Costs related to shipping and handling are included in selling expenses for all periods presented.



Advertising

Advertising costs are expensed, when incurred. The cost charged to the statement of operations in 2004 amounted to USD0.1 million (2003: USD0.3 million, 2002: USD0.3 million).

Impairment or disposal of long-lived assets and intangible assets other than goodwill

The Group accounts for impairment of long-lived fixed assets in accordance with the provisions of SFAS No. 144, *Accounting for the Impairment or Disposal of Long-Lived Assets*. This Statement requires that long-lived assets and purchased intangibles subject to amortization be reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Recoverability of assets to be held and used is measured by a comparison of the carrying amount of an asset to future estimated undiscounted cash flows expected to be generated by the asset. If the carrying amount of an asset exceeds its estimated future cash flows, an impairment charge is recognized by the amount by which the carrying amount of the asset exceeds the fair value of the asset. Assets held for sale are reported at the lower of the carrying amount or fair value, less costs to sell and are no longer depreciated.

Provisions

The Group recognizes provisions for liabilities and probable losses that have been incurred as of the balance sheet date and for which the amount is uncertain but can be reasonably estimated.

In June 2002, the FASB issued SFAS No. 146, *'Accounting for Costs Associated with Exit or Disposal Activities'*. This statement nullifies the accounting for restructuring costs provided in EITF Issue No. 94-3 *'Liability Recognition for Certain Employee Termination Benefit and Other Costs to Exit an Activity (Including Certain Costs Incurred in a Restructuring).'* The principal difference between SFAS No. 146 and EITF No. 94-3 that affects the Group relates to the timing of the recognition of a liability for a cost associated with an exit or disposal activity, including restructurings. SFAS No. 146 requires that a liability be recognized and measured at fair value only when incurred. In contrast, under Issue 94-3 the Group recognized a liability for an exit cost or recorded a restructuring provision when it committed to an exit plan.

Liabilities related to one-time employee termination benefits are recognized ratably over the future service period when those employees are required to render services to the Group, if that period exceeds 60 days or a longer legal notification period. The Statement is effective for exit or disposal activities that are initiated after December 31, 2002 and has been adopted by the Group as of January 1, 2003.

Under FASB SFAS No. 88, *'Employers' Accounting for Settlements and Curtailments of Defined Benefit Pension Plans and for Termination Benefits'*, if contractual termination benefits have been agreed to in advance between the company and its employees and are payable when a specified event occurs, the cost shall be recognized as a liability and an expense when payment of the benefits is probable.

Employee termination benefits covered by a contract or under an ongoing benefit arrangement are to be accounted for under SFAS No. 112 *'Employers' Accounting for Postemployment Benefits'* and are recognized when it is probable that the employees will be entitled to the benefits and the amounts can be reasonably estimated.



Environmental liabilities and other contingencies

Provisions for environmental liabilities and other contingencies resulting from past operations or events are recognized when it is probable that a liability has been incurred and the amount can be reasonably estimated.

Pursuant to the JV Agreement, environmental liabilities and certain tax contingencies arising in respect of the Philips and LGE CRT Businesses transferred to the Group, relating to events occurring on or prior to June 30, 2001, were classified as "excluded liabilities" and were not transferred to the Group. These liabilities are the responsibility of Philips and LGE respectively and accordingly, no provision has been recorded in the Group's financial statements as at December 31, 2004 or 2003 in respect of any such liabilities.

Revenue recognition

The Group recognizes revenue when delivery has taken place pursuant to a customer purchase order, the sales price is fixed or determinable, and collectibility is reasonably assured. Generally, these criteria are met at the time the product is shipped or services are rendered and the customer takes ownership and assumes the risk of loss. Revenues are recorded net of sales taxes, customer discounts, rebates and similar charges.

Government grants

Government grants, other than those relating to assets, are recognized in the statement of operations as qualified expenditures are incurred.

Taxes

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statements carrying amounts of existing assets and liabilities and their respective tax bases and operating losses and tax credits available for carry forward.

Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on the deferred tax assets and liabilities of a change in tax rate is recognized in the statement of operations in the period that includes the enactment date.

The Group provides a valuation allowance for deferred tax assets for which it does not consider realisation of such assets to be more likely than not.

Operating leases

Rentals payable in respect of assets held or provided under operating leases are accounted for in the statement of operations on a straight-line basis over the periods of the respective leases.



Pension and other post-retirement plans

The Group accounts for the cost of pension plans and postretirement benefits other than pensions in accordance with SFAS No. 87, "Employers' Accounting for Pensions", and SFAS No. 106, "Postretirement Benefits other than Pensions", respectively. Most of the Group's defined-benefit plans are funded with plan assets that have been segregated and restricted in a trust to provide for the pension benefits to which the Group has committed itself.

The Group has certain defined benefit pension plans covering a portion of its employees. Pension costs in respect of defined-benefit plans primarily represent the increase in the actuarial present value of the obligation for pension benefits based on employee service during the year and the interest on this obligation in respect of employee service in previous years, net of the expected return on plan assets.

The Group also has certain defined contribution pension plans where agreed amounts (usually based on a percentage of salary) are paid regularly to a pension plan. Expenses under these plans are recognized as incurred in the statement of operations. In certain countries, the Group also provides post-retirement benefits other than pensions. The cost relating to such plans consists primarily of the present value of the benefits attributed on an equal basis to each year of service, interest cost on the accumulated post-retirement benefit obligation, which is a discounted amount, and amortization of the unrecognized transition obligation.

Further details of the Group's pension and post-retirement pension plans are discussed in note 24 to the financial statements.

Unrecognized actuarial gains and losses are recognized in the statement of operations over the expected average remaining working lives of the employees participating in the plan.

Unrecognized prior service costs related to pension plans and post-retirement plans other than pensions are being amortized by assigning a proportional amount to the statement of operations of a number of years, reflecting the average remaining service period of the active employees.

Warranties and guarantees

Estimates for warranty costs are made based primarily on historical warranty claim experience. Estimated warranty costs are accrued at the time of sale and are recorded in cost of sales.

Use of estimates

The preparation of the consolidated financial statements requires management to make estimates and assumptions that affect reported amounts of assets and liabilities and disclosures of contingent assets

and liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates. Estimates are used when accounting for matters such as allowance for uncollectible accounts receivable, inventory obsolescence, depreciation and amortization, deferred taxes, provisions, impairment of long lived assets, defined pension and post-retirement benefits, valuation of investments and goodwill.

Recent accounting pronouncements

In May 2003, FASB Statement No. 150, 'Accounting for Certain Financial Instruments with Characteristics of both Liabilities and Equity' was issued. This Statement establishes standards for the classification and measurement of certain financial instruments with characteristics of both liabilities and equity. The Statement also includes required disclosures for financial instruments within its scope. For the Group, the Statement was effective for instruments entered into or modified after May 31, 2003 and otherwise became effective as of January 1, 2004, except for certain mandatorily redeemable financial instruments. For certain mandatorily redeemable financial instruments, the Statement will be effective for the Group



on January 1, 2005. The effective date has been deferred indefinitely for certain other types of mandatorily redeemable financial instruments. The Group currently does not have any financial instruments that are within the scope of this Statement.

In December 2003, the FASB issued FASB Interpretation No. 46 (revised December 2003) ("FIN 46R"), *Consolidation of Variable Interest Entities*, which addresses how a business enterprise should evaluate whether it has a controlling financial interest in an entity through means other than voting rights and accordingly should consolidate the entity. The Group applies FIN 46R to variable interests in VIEs created after December 31, 2003. For variable interests in VIEs created before January 1, 2004, the Interpretation will be applied beginning on January 1, 2005. For any VIEs that must be consolidated under FIN 46R that were created before January 1, 2004, the assets, liabilities, and noncontrolling interests of the VIE initially would be measured at their carrying amounts with any difference between the net amount added to the balance sheet and any previously recognized interest being recognized as the cumulative effect of an accounting change. If determining the carrying amounts is not practicable, fair value at the date FIN 46R first applies may be used to measure the assets, liabilities, and noncontrolling interest of the VIE. The Group currently does not have any VIEs that are within the scope of this Interpretation.

In December 2003, FASB Statement No. 132 (revised), *Employers' Disclosures about Pensions and Other Postretirement Benefits* was issued. Statement 132 (revised) prescribes employers' disclosures about pension plans and other postretirement benefit plans; it does not change the measurement or recognition of those plans. The Statement retains and revises the disclosure requirements contained in the original Statement 132. It also requires additional disclosures about the assets, obligations, cash flows, and net periodic benefit cost of defined benefit pension plans and other postretirement benefit plans. The new annual disclosure requirements became effective for the Group as of the year ended December 31, 2004. The Group's disclosures in Note 24 incorporate the relevant requirements of Statement 132 (revised).

In May 2004, the FASB issued FSP No. 106-2 ("FSP 106-2"), *Accounting and Disclosure Requirements Related to the Medicare Prescription Drug, Improvement and Modernization Act of 2003* (the 'Medicare Act'). The Medicare Act was enacted December 8, 2003. FSP 106-2 supersedes FSP 106-1, *Accounting and Disclosure Requirements Related to the Medicare Prescription Drug, Improvement and Modernization Act of 2003*, and provides authoritative guidance on accounting for the federal subsidy specified in the Medicare Act. The Medicare Act provides for a federal subsidy equal to 28% of certain prescription drug claims for sponsors of retiree health care plans with drug benefits that are at least actuarially equivalent to those to be offered under Medicare Part D, beginning in 2006. The effects of the Medicare Act relating to measures of the accumulated postretirement benefit obligation or the net periodic postretirement benefits as mandated by FASB Staff Position 106-2 were not material to the Group.

FASB Staff Position ("FSP") No. 109-2, *Accounting and Disclosure Guidance for the Foreign Earnings Repatriation Provision within the American Jobs Creation Act of 2004* ("FSP 109-2"), provides guidance under FASB Statement No. 109, *Accounting for Income Taxes*, with respect to recording the potential impact of the repatriation provisions of the American Jobs Creation Act of 2004 (the "Jobs Act") on enterprises' income tax expense and deferred tax liability. The Jobs Act was enacted on October 22, 2004. FSP 109-2 states that an enterprise is allowed time beyond the financial reporting period of enactment to evaluate the effect of the Jobs Act on its plan for reinvestment or repatriation of foreign earnings for purposes of applying FASB Statement No. 109. This Staff Position is not expected to have a material impact on the Group's financial statements.

In December 2004, Statement No. 151, *Inventory Costs, an amendment of ARB No. 43, Chapter 4, Restatement and Revision of Accounting Research Bulletins*, was issued. This Statement clarifies the accounting for abnormal amounts of idle facility expense, freight, handling costs, and wasted material (spoilage) and prohibits such costs from being capitalized in inventory. In addition, this Statement requires that allocation of fixed production overheads to the inventory cost be based on the normal capacity of the production facilities. This Statement is not expected to have a material effect on the Group's financial statements.



In December 2004, the FASB issued Statement No. 153, 'Exchanges of Non-monetary Assets', an amendment of APB Opinion No. 29, 'Accounting for Nonmonetary Transactions'. This Statement eliminates the exception in APB No. 29 for non-monetary exchanges of similar productive assets and replaces it with a general exception for exchanges of non-monetary assets that lack commercial substance. The Statement is not expected to have a material impact on the Group's financial statements.

SFAS No. 123 (revised 2004), concerning Share-Based Payment was issued in December 2004. The Statement is a revision of Statement No. 123, 'Accounting for Stock-Based Compensation'. Statement No. 123 (revised), supersedes APB Opinion No. 25, 'Accounting for Stock Issued to Employees', that allowed the use of the intrinsic value for measuring stock-based compensation expenses for stock issued to employees. The revised Statement focuses primarily on accounting for transactions in which an entity obtains employee services in share-based payment transactions. The revised Statement contains certain changes compared with the original pronouncement. This Statement is not expected to have a material impact on the Group's financial statements.

Reclassifications

Certain balance sheet and statement of operations items previously reported under specific financial statement captions have been reclassified to conform with the 2004 presentation.

6. Other income, net

Other income/ (expenses) comprise:

amounts in USD million

	2004	2003	2002
Gain/ (Loss) on disposal of fixed assets	11	(1)	1
Royalty income	4	5	-
Amounts received from insurance claims	-	1	41
Gain on sale of subsidiaries	-	36	-
Miscellaneous income	17	20	9
	32	61	51

7. Restructuring and impairment costs

As the Group is impacted by worsening market conditions and increased price erosion, it has undertaken a number of restructuring programs during 2002, 2003 and 2004.

The following table presents the movements in restructuring provisions during the year:

amounts in USD million

	Balance as of January 1, 2004	Addition	Charge	Utilized	Balance as of December 31, 2004
Write-down of assets	-	-	(209)	209	-
Personnel costs	(79)	(78)	(93)	117	(133)
Other costs	(41)	-	(25)	27	(39)
Total	(120)	(78)	(327)	353	(172)

amounts in USD million

	Balance as of January 1 2003	Charge	Utilized	Balance as of December 31, 2003
Write-down of assets	-	(764)	764	-
Personnel costs	(46)	(143)	110	(79)
Other costs	(24)	(35)	18	(41)
Total	(70)	(942)	892	(120)



amounts in USD million

	Balance as of January 1				Balance as of December 31,
	2002	Charge	Utilized	Releases	2002
Write-down of assets	-	(456)	456	-	-
Personnel costs	(9)	(90)	45	8	(46)
Other costs	(14)	(24)	14	-	(24)
Total	(23)	(570)	515	8	(70)

Asset write-downs for 2004 were mainly related to CPT and Comp operations whereas those for 2003 & 2002 were mainly related to CPT and CDT operations. The charge in 2004 included USD50 million with respect to the acquisition of Barayo as explained in note 29.

The movements in the restructuring provision in 2004 are presented by business segment as follows:

amounts in USD million

	Balance as of January 1,				Balance as of December 31,
	2004	Addition	Charge	Utilized	2004
CPT	(68)	(78)	(232)	214	(164)
CDT	1	-	(1)	-	-
COMP	(53)	-	(94)	139	(8)
Total	(120)	(78)	(327)	353	(172)

Restructuring and impairment charges during 2004 of USD327 million are presented by business segment as follows:

amounts in USD million

	Write-down of assets	Personnel costs	Other costs	Total
CPT	(130)	(86)	(16)	(232)
CDT	-	(1)	-	(1)
COMP	(79)	(6)	(9)	(94)
Total	(209)	(93)	(25)	(327)

The movements in the restructuring provisions in 2003 are presented by business segment as follows:

amounts in USD million

	Balance as of January 1,			Balance as of December 31,
	2003	Charge	Utilized	2003
CPT	(38)	(590)	560	(68)
CDT	(15)	(199)	215	1
COMP	(17)	(153)	117	(53)
Total	(70)	(942)	892	(120)



Restructuring and impairment charges during 2003 of USD942 million are presented by business segment as follows:

amounts in USD million

	Write-down of assets	Personnel costs	Other costs	Total
CPT	(494)	(74)	(22)	(590)
CDT	(196)	(2)	(1)	(199)
COMP	(74)	(67)	(12)	(153)
Total	(764)	(143)	(35)	(942)

The movements in the restructuring provisions in 2002 are presented by business segment as follows:

amounts in USD million

	Balance as of January 21, 2002	Charge	Utilized	Releases	Balance as of December 31, 2002
CPT	(3)	(252)	217	-	(38)
CDT	(4)	(247)	230	6	(15)
COMP	(16)	(71)	68	2	(17)
Total	(23)	(570)	515	8	(70)

Restructuring and impairment charges during 2002 of USD570 million are presented by business segment as follows:

amounts in USD million

	Write-down of assets	Personnel costs	Other costs	Total
CPT	(190)	(48)	(14)	(252)
CDT	(222)	(19)	(6)	(247)
COMP	(44)	(23)	(4)	(71)
Total	(456)	(90)	(24)	(570)

A number of restructuring programs were announced and charged to the statement of operations in 2004 as follows:

During 2004, The Group completed the closures of its factories in Aachen CPT (Germany), Simonstone (UK), Newport (UK) and Southport (UK) which were announced in 2003. The related restructuring charges in 2004 amounted to USD37 million.

To reduce overhead costs and improve competitiveness, the Group reduced the workforce of its Aachen Glass plant (Germany) by 20% in 2004. The restructuring charges in this respect amounted to USD10 million.

In October 2004 the Group purchased the 90% share in Barayo S.A. and Barayo Proyectos S.A. (hereinafter referred to as "Barayo"). Refer to note 29 for further information. The Group subsequently announced the closure of Barayo in February 2005.

In December 2004, the Group announced the downsizing of operations in its CRT factory in Dreux, France. The related restructuring costs are estimated at USD70 million. The downsizing is anticipated to be completed in 2005.



As a consequence of the above restructuring activities and the changing operating environment, the Group performed an assessment of the carrying values of its long-lived assets under FAS 144, and which resulted in the recording of impairment losses of USD159 million mainly in France and Germany, and also in the UK, North America and Korea.

The number of staff affected by the above restructuring programs in 2004 is estimated by management to be around 4,500 persons.

In January 2003, the Group announced the downsizing of operations in Sittard and Stadskanaal, both in The Netherlands. Their related restructuring costs were USD14 million and USD3 million respectively.

In April 2003, the Group announced the intention to consolidate its competence centre activities in Eindhoven (The Netherlands). The Washington site in Tyne & Wear (UK) was therefore closed, resulting in restructuring costs of USD5 million.

In May 2003, the Group announced the closure of the Newport (UK) and Southport (UK) plants, resulting in a charge of USD18 million and USD5 million respectively.

In June 2003, the Group announced the downsizing of the Blackburn (UK) plant, resulting in restructuring costs of USD11 million.

In October 2003, the Group communicated to the employees of Aachen Glass (Germany) about the downsizing of operations, resulting in a charge of USD7 million.

In December 2003, the Group announced the closure of Aachen CPT (Germany) and Simonstone Glass (UK), resulting in a charge of USD207 million.

In addition to the above, other restructuring costs of USD56 million were incurred at other locations. Furthermore, the Group assessed the carrying values of long-lived assets and recorded impairment losses of USD616 million in 2003 in Korea, South America, U.K., China, France, The Netherlands and other sites.

The number of staff affected by the restructuring programs in 2003 is estimated by management to be around 3,500 persons.

In January 2002, the Group announced its intention to discontinue all operations in the Group's Ottawa plant by the end of 2002, resulting in restructuring, impairment and termination charges of USD145 million.

In January 2002, the Group reduced its workforce in Korea and the related employee severance costs amounted to USD5 million.

The restructuring of operations in Austria was announced in March 2002, resulting in restructuring costs of USD85 million.

Restructuring in Washington, UK was announced in April 2002, resulting in a charge of USD7 million.

In June 2002, the closure of certain operations in Aachen, Germany was announced, resulting in a charge of USD14 million.

In October 2002, the research and development workforce in The Netherlands was reduced, resulting in a charge of USD7 million.

In December 2002, the Group announced the closure of the Juarez, Mexico plant. The restructuring costs were USD9 million.



In addition to the above, other restructuring costs of USD31 million were incurred across other locations. Furthermore, the Group assessed the carrying values of long-lived assets and recorded impairment losses of USD267 million in 2002 in Taiwan, Korea, Spain, Netherlands, USA, UK (Newport) and other sites.

The number of staff affected by the restructuring programs in 2002 is estimated by management to be in the region of 4,900 persons.

The total amount of costs incurred during 2004, cumulative amount incurred to 2004 and expected to be incurred associated with the restructuring activities initiated after December 31, 2002 by reporting segments and by major types of costs are:

amounts in USD million

	Amount incurred for the year	Cumulative amount incurred to date	Costs expected to be incurred but not provided for
CPT	(216)	(741)	(49)
CDT	(1)	(197)	(3)
COMP	(92)	(275)	(8)
Total	(309)	(1,213)	(60)

amounts in USD million

	Amount incurred for the year	Cumulative amount incurred to date	Costs expected to be incurred but not provided for
Write-down of assets	(187)	(935)	(7)
Personnel costs	(97)	(224)	(38)
Other costs	(25)	(54)	(15)
Total	(309)	(1,213)	(60)

The above-mentioned activities are expected to be completed by 2005.

8. Finance income and expenses

Finance income and expenses are set out below:

amounts in USD million

	2004	2003	2002
Interest income	9	3	8
Interest expense, gross	(77)	(86)	(100)
Interest capitalized	-	-	2
Interest expense (net)	(68)	(83)	(90)
Impairment loss on available-for-sale securities (note 17)	-	(4)	-
Foreign exchange (losses)/ gains	(11)	44	(16)
Gain on disposal of available-for-sale securities	5	-	-
Miscellaneous financing costs	(21)	(14)	(16)
	(95)	(57)	(122)



A loan facility amendment fee of USD1.85 million, was paid in May 2002 and is amortized over the remaining period of the related syndicated loan facility. In addition, an arrangement fee of USD0.2 million was incurred in respect of the issuance of the Group's EUR200 million Floating Rate Notes ("FRN"), and which is being amortized over a period of 5 years, being the term of the FRN. During 2001, loan arrangement costs of USD35 million arose in respect of the Group's syndicated loan facility and such costs are being amortized over the term of the revolving loan. Miscellaneous financing costs represent the amortization charge of loan arrangement fees over the respective periods of such loans.

9. Taxes

Income taxes

Net tax credit relating to continuing operations amounted to USD16 million in 2004 (2003: USD18 million, 2002: USD2 million).

Loss before taxes comprises:

amounts in USD million

	2004	2003	2002
The Netherlands	(5)	(59)	(303)
Foreign	(132)	(818)	(224)
	(137)	(877)	(527)

Tax credit comprises:

amounts in USD million

	2004	2003	2002
The Netherlands:			
Current taxes	1	1	-
Deferred taxation	-	-	3
	1	1	3
Foreign:			
Current taxes	17	7	20
Deferred taxation	(34)	(26)	(25)
	(17)	(19)	(5)
	(16)	(18)	(2)

The Group's operations are subject to income taxes in various foreign jurisdictions with statutory income tax rates varying from 10% to 40%. The major reconciling item between the weighted average statutory income tax rate as a percentage of income before taxes and effective income tax rate is the change in valuation allowance.

The tax effects of transactions recorded as accumulated other comprehensive income (loss) within stockholders' equity/ (deficit) are recognized on a net-of-tax basis. The tax charge relating to the deferred results on hedge transactions was not considered material. Other items affecting accumulated other comprehensive income do not have tax consequences.

**Deferred tax**

The principal components of deferred tax in the balance sheet are set out below:

amounts in USD million

	2004		2003	
	Assets	Liabilities	Assets	Liabilities
Goodwill and intangible assets	7	-	77	-
Property, plant and equipment	119	(56)	136	(16)
Inventories	1	-	-	(2)
Receivables	2	-	1	(1)
Provisions:				
Pensions	14	-	2	-
Restructuring	39	-	7	-
Others	3	(5)	16	(1)
Other assets	-	-	5	-
Other liabilities	1	(2)	1	-
Tax credits	36	-	-	-
Tax losses	410	-	405	-
	632	(63)	650	(20)
Valuation allowance	(533)	-	(618)	-
Net deferred tax assets/ (liabilities)	99	(63)	32	(20)
Net deferred tax position	36	-	12	-

In assessing the realisability of deferred tax assets, management considers whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realisation of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible. Management considers the scheduled reversal of deferred tax liabilities, projected future taxable income, and tax planning strategies, including those undertaken in conjunction with the Group's Parents, in making this assessment. In order to fully realize the deferred tax assets, the Group will need to generate future taxable income in the countries where the net operating losses were incurred. Based upon the level of historical taxable income and projections for future taxable income over the periods in which the deferred tax assets are deductible, management believes it is more likely than not that the Group will realize the benefits of these deductible differences, net of the existing valuation allowance at December 31, 2003 and 2004.

The valuation allowance for deferred tax assets as of December 31, 2004, 2003 and 2002 was USD533 million, USD618 million and USD270 million respectively. The net change in the total valuation allowance for the year ended December 31, 2004 and 2003 was a decrease of USD85 million and an increase of USD348 million, primarily representing the change in property, plant and equipment and tax losses.

The amounts have been classified in the consolidated balance sheet as follows:-

amounts in USD million

	2004		2003	
	Deferred tax asset	Deferred tax liability	Deferred tax asset	Deferred tax liability
Current portion	5	(2)	13	(4)
Non-current portion	36	(3)	17	(14)
	41	(5)	30	(18)



At December 31, 2004, the Group has net operating loss and tax credit carry forwards for income tax purposes of USD1,804 million (2003: USD1,109 million) which are available to offset future taxable income.

At December 31, 2004, estimated tax loss and tax credit carry forwards are expected to expire as follows:

Total	2005	2006	2007	2008	2009	2010 to 2024	Unlimited
1,804	166	-	-	70	77	614	877

The Group makes estimates of amounts payable for taxation based on its interpretation of the relevant tax rules and legislation, which in certain aspects is subject to interpretation and varying local practice. Management is satisfied that all material amounts payable in respect of corporate taxes, sales tax and value added tax and similar amounts where appropriate have been adequately accrued for in the financial statements.

10. Cumulative effect of a change in accounting principle

As at January 1, 2002, the Group adopted SFAS No. 142, *Goodwill and Other Intangible Assets*. On January 1, 2002, the Group followed the two-step approach for the goodwill transitional impairment test. In the first step of the impairment test, the Group calculated the fair value of each reporting unit and compared the amount with the carrying amount of the reporting units. Since the fair value was lower than the carrying amount, the second step of the goodwill impairment test was undertaken. An impairment loss of USD5 million was recorded as of January 1, 2002 as the cumulative effect of a change in accounting principle as a consequence of the adoption of SFAS No. 142.

11. Cash and cash equivalents

Cash balances are held in various locations throughout the world including substantial amounts held outside of The Netherlands. Although the Group intends to include cash balances from many locations as possible in a global cash pooling system, the repatriation of some foreign balances is restricted by local laws and exchange control in certain jurisdictions in respect of which cash and cash equivalents of USD67 million (2003: USD163 million) was recorded in the consolidated balance sheet. Where local restrictions prevent an efficient inter-company transfer of funds, the Group's intention is that cash balances would remain in the foreign country and the Group would meet liquidity needs through ongoing cash flows, external borrowings or both.

At December 31, 2004, the Group has in total USD50 million deposited in a Cash Reserve Account which account was opened with the agent bank on behalf of the bank syndicate of the USD2,000 million syndicated loan facility and has been pledged to the agent bank. The cash balance standing to the credit of this account can only be applied towards debt repayment or prepayment and interest payment according to the requirements set forth in the Restructuring Agreement and is therefore restricted. Accordingly, this is included in non-current assets.



12. Accounts receivable

Accounts receivable includes trade and notes receivable from sales of goods and services to customers and is net of an allowance for doubtful accounts.

The changes in the allowance for doubtful accounts are as follows:

amounts in USD million

	2004	2003	2002
Balance as of January 1	9	27	24
Charge during year	9	16	24
Write-offs charged against the allowance	(5)	(34)	(21)
Balance as of December 31,	13	9	27

13. Inventories

Inventories comprise:

amounts in USD million

	2004	2003
Raw materials and supplies	115	128
Work in progress	35	54
Finished goods	105	129
	255	311
Less: Provision for obsolescence	(23)	(22)
Total	232	289

14. Related party transactions

In addition to those disclosed elsewhere in these financial statements, the following sets out material related party transactions between the Group and related parties:

amounts in USD million

	2004			2003		2002	
	LGE	Philips	Anfei	LGE	Philips	LGE	Philips
Sales	893	905	3	855	836	856	966
Purchases	400	32	50	507	48	530	41
Amount due (to)/ from LGE, Philips and Anfei at December 31,							
Amount due to	(52)	(14)	(9)	(77)	(9)	(27)	(35)
Amount due from	94	85	1	97	94	129	149

In the opinion of management, the above material transactions have been entered into by the Group in the normal course of its business.



As of July 14, 2004, both LGE and Philips contributed cash as additional equity investment in the Group in the amount of USD250 million each. As part of the restructuring of the Company's syndicated loan, the then existing guarantees for an amount of USD200 million from each parent as security for the Company's syndicated loan were released and replaced by a guarantee of USD50 million from each parent for the payment obligations in relation to the restructured syndicated loan. In addition, LGE and Philips repaid an amount of USD50 million each towards normal trade receivables prior to January 7, 2004 and have agreed as of July 14, 2004 to continue their repayments so as to maintain at the last day of each quarter this working capital reduction for the Group in an amount not less than USD50 million each.

In 2003, the Group sold its interest in LG.Philips Displays Austria to Philips. The sales proceeds reflected in the financial statements amounted to USD21 million. The result for the year ended December 31, 2003 included the gain on this disposal of this interest for USD24 million. As part of the sale, the Group had provided certain guarantees to indemnify Philips for third party claims for any liabilities, obligations, contingent liabilities or any other risks by the Group's Austrian operations during the period when the Group controlled these operations. This guarantee shall not exceed in aggregate a maximum amount of Euro 5 million, except for risks of product liability, where no maximum amount will apply.

At the end of 2003, LG.Philips Displays Wales signed a real estate sales contract with LGE. LGE had paid USD13 million deposit to the Group in December 2003. The gain of the real estate sales amounted to USD16 million and was recognized in 2004 as the legal title had been transferred from the Group to LGE.

In December 2003 and January 2004, the Group received from Philips and LGE an amount of USD0.5 million each which completed the disposal of 2% of the shares of LG.Philips Displays Brazil to LGE and Philips, making LGE and Philips each a 1% shareholder of LG.Philips Displays Brazil.

In March 2004, the Group made the balance payments in respect of an investment in Henan Anfei Electronic Glass Company Limited ("Anfei") amounting to USD19.4 million, which completed the acquisition of a 34% interest in Anfei.

The Group has various operating businesses in the United Kingdom, which are part of a legal branch of LG.Philips Displays Netherlands BV ("LPDN"). The UK operations have been loss making and management is satisfied that current year tax losses are available for carry forward and consortium relief. LPDN and Philips Electronics UK ("PEUK") have entered into a Compensation Agreement for Tax Losses ("the Agreement") whereby PEUK will pay LPDN for the benefit of current year tax losses it can utilize under consortium relief provisions. The availability and utilization of the losses is dependant on such consortium relief loss surrenders being in compliance with UK and European Union legislation, which is expected to be tested by the UK Inland Revenue authority, but the management is confident it should prevail as confirmed by positive legal advice from a Queen's Counsel in the UK. Under the Agreement, payment is made by PEUK to LPDN for 50% of LPDN's UK losses on the basis of estimated tax losses available for surrender. The tax benefit is shared 50/50 between PEUK and LPDN. Consequently, LPDN receives GBP7.5 per GBP100 of current year tax losses as the current tax rate in the UK is 30%. During 2004, LPDN had received GBP4 million (2003: GBP6 million, 2002: Nil) (2004: USD8 million, 2003: USD10 million, 2002: Nil) from PEUK for the transfer of LPDN's UK tax losses (for 2003 and 2004). These amounts would be repayable to PEUK should the consortium relief claims be held to be invalid.

Results for the year ended December 31, 2002 included fire insurance claimed from LGE of USD40.5 million, the sales of intellectual property to Philips of USD20 million, quality rebates from LGE of USD3 million, R&D service provided to LGE of USD5 million and income of USD3 million from LGE relating to divestment of 'Fly Back Transformer' business.

Both LGE and Philips have provided certain indemnities for various items including certain litigation matters and also pre-formation liabilities such as certain tax liabilities and environmental liabilities that may come to light in respect of events or conditions relating to periods prior to June 30, 2001.



Additionally, the Group has service level agreements with both LGE and Philips. The Group makes payment to LGE and Philips pursuant to service level agreements, and services provided by LGE and Philips are charged on a cost plus basis and vice versa where the Group provides services to LGE and Philips.

15. Other current assets

Other current assets primarily consist of prepaid expenses.

16. Investment in unconsolidated companies

In March 2004, the Group made the balance payments in respect of an investment in Henan Anfei Electronic Glass Company Limited ("Anfei") amounting to USD19.4 million.

With this further equity injection, and the receipt of the business license, the Group has increased its equity investment to USD22 million representing a shareholding of 34%. The Group has adopted the equity method of accounting in respect of this investment. Included in investment is USD6 million, representing the excess of the Group's investment over its underlying equity in the net assets of the unconsolidated company.

At December 31, 2003, Anfei was still awaiting the grant of the final business licence from the Chinese Government, and accordingly, the USD3.4 million initial investment was accounted for as an investment deposit in Anfei. As the Group did not have a majority controlling interest and was also not able to exercise significant influence over Anfei as of December 31, 2003, the investment was recorded at cost in the Group's consolidated balance sheet.

The changes during 2004 are as follows:

amounts in USD million

	Investments
Balance as of January 1, 2004	3
Acquisitions/ additions	19
Share of loss	(2)
Translation differences	1
Balance as of December 31, 2004	21

The results related to unconsolidated companies shown in Statement of Operations also included the share of loss of other unconsolidated companies of USD3 million, which were subsequently acquired by the Group to become its subsidiaries during 2004, as explained in note 29.

17. Other non-current financial assets

During 2003, the Group invested in a bond issued by LG Card amounting to USD17 million. This investment was classified as an available-for-sale security. LG Card was undergoing financial difficulties and restructuring in 2003 and in light of those circumstances, an other-than-temporary impairment charge of USD4 million was recorded against this investment to write the investment down to its fair value. During 2004, this investment was disposed of for USD18 million.

18. Other non-current assets

Included in other non-current assets in 2004 are mainly rental and utility deposits whereas those in 2003 were mainly amounts receivable of USD11.6 million, net of allowance of USD2.5 million from a former group company that was sold during 2003.

**19. Property, plant and equipment***amounts in USD million*

COST	Total	Land and Buildings	Land and Buildings (held for sale)	Machinery	Other equipment	Construction in progress
Balance as of January 1, 2004	3,298	748	-	2,301	145	104
Additions	137	9	-	37	11	80
Acquisition	72	-	72	-	-	-
Transfer and reclassification	-	9	-	50	(4)	(55)
Disposals and write-offs	(543)	(43)	-	(474)	(26)	-
Translation differences	131	29	-	94	5	3
	(203)	4	72	(293)	(14)	28
Balance as of December 31, 2004	3,095	752	72	2,008	131	132
ACCUMULATED DEPRECIATION AND IMPAIRMENT	Total	Land and Buildings	Land and Buildings (held for sale)	Machinery	Other equipment	Construction in progress
Balance as of January 1, 2004	(1,574)	(221)	-	(1,226)	(73)	(54)
Depreciation charged for the year	(222)	(32)	-	(167)	(23)	-
Impairments	(159)	(22)	-	(119)	(17)	(1)
Disposals and write-offs	518	30	-	462	26	-
Translation differences	(67)	(6)	-	(55)	(6)	-
	70	(30)	-	121	(20)	(1)
Balance as of December 31, 2004	(1,504)	(251)	-	(1,105)	(93)	(55)
Net book value at December 31, 2004	1,591	501	72	903	38	77
Net book value at December 31, 2003	1,724	527	-	1,075	72	50

In 2004, the Group entered into a land sale agreement with a real estate company in Spain. The carrying value of the land has been classified as held for sale. The land sale transaction is expected to be consummated by 2005. Such land held for sale is reported under the CPT product segment.

Land (with a book value of USD103 million) is not depreciated.

In view of the declining CRT market, price erosion and keen competition from LCD and plasma technologies, the Group recorded impairment charges of USD159 million in respect of its property, plant and equipment (see note 7).

No interest was capitalized during the year ended December 31, 2004 (2003: Nil, 2002: USD2 million).

**20. Leases**

The Group has non-cancellable operating leases, primarily for computer equipment, that expire within the next year. These leases generally contain renewal options for periods ranging from three to five years. The Group's operating leases also include non-cancellable operating leases for property, which expire over periods ranging from 6 months to 7 years.

Future minimum lease payments under non-cancellable operating leases as of December 31, 2004 are:

amounts in USD million

Year ending December 31

2005	13
2006	6
2007	5
2008	3
2009	3
After 5 years	4
Total minimum leases payments	34

Operating lease expenses amounted to USD19.7 million in 2004 (2003: USD29.9 million, 2002: USD28.0 million).

21. Goodwill and intangible assets

amounts in USD million

COST	Total	Goodwill	Software	Other intangibles
Balance as of January 1, 2004	450	364	17	69
Additions	3	-	3	-
Translation differences	2	-	1	1
	5	-	4	1
Balance as of December 31, 2004	455	364	21	70
ACCUMULATED AMORTIZATION AND IMPAIRMENT				
Balance as of January 1, 2004	(160)	(130)	(9)	(21)
Amortization	(11)	-	(3)	(8)
Translation differences	(2)	-	(1)	(1)
	(13)	-	(4)	(9)
Balance as of December 31, 2004	(173)	(130)	(13)	(30)
Net book value at December 31, 2004	282	234	8	40
Net book value at December 31, 2003	290	234	8	48

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Goodwill assigned to products segment

*amounts in USD
million*

	Balance as of January 1, 2004	Impairment	Total
CPT	234	-	234
CDT	-	-	-
COMP	-	-	-
Total	234	-	234

*amounts in USD
million*

	Balance as of January 1, 2003	Impairment	Total
CPT	234	-	234
CDT	89	(89)	-
COMP	-	-	-
Total	323	(89)	234

The Group evaluates goodwill on an annual basis as of the fourth quarter, and whenever events and changes in circumstances indicate that there may be a potential impairment. Future goodwill impairment tests could result in further charges to earnings.

Amortizing intangible assets

At December 31, 2004, amortizing intangible assets consisted of:

amounts in USD million

	Gross carrying amount	Weighted average amortization period (years)	Accumulated amortization
Acquired intangible assets			
Software	21	3	(13)
Intellectual property rights	58	10	(21)
Technology-based	10	5	(7)
Other intangible assets	2	5	(2)
	91	7.27	(43)



At December 31, 2003, amortizing intangible assets consisted of:

amounts in USD million

Acquired intangible assets	Gross carrying amount	Weighted average amortization period (years)	Accumulated amortization
Software	17	3	(9)
Intellectual property rights	57	10	(14)
Technology-based	10	5	(5)
Other intangible assets	2	5	(2)
	<u>86</u>	<u>7.27</u>	<u>(30)</u>

Amortization expense related to amortizing intangible assets was USD11 million for the year ended December 31, 2004 (2003: USD16 million; 2002: USD11 million).

The estimated amortization expenses for these amortizing intangible assets for each of the five succeeding years are:

amounts in USD million

2005	12
2006	9
2007	7
2008	6
2009	6

22. Provisions and other liabilities

Provisions comprise:

amounts in USD million

	2004		2003	
	Current portion	Non current portion	Current portion	Non current portion
Pensions	-	9	-	7
Other post-retirement benefits	2	39	1	38
Restructuring	168	4	110	10
Jubilee	2	2	1	4
Obligatory severance payment	2	32	7	25
Warranty	4	12	5	5
Other liabilities	158	5	187	2
	<u>336</u>	<u>103</u>	<u>311</u>	<u>91</u>



Other liabilities are summarized as follows:

amounts in USD million

	2004		2003	
	Current portion	Non current portion	Current portion	Non current portion
Personnel related costs				
Salaries and wages	29	-	25	-
Accrued holiday entitlements	13	-	12	-
Other personnel-related costs	12	-	13	-
Deferred income	24	-	21	-
Fixed assets related costs (Gas, water, electricity, rent and other)	17	-	15	-
Distribution costs	9	-	9	-
Material related costs	8	-	5	-
Sales related costs	2	-	2	-
Interest related accruals	1	-	15	-
Derivative instruments - liabilities	-	-	31	-
Other accrued liabilities	43	5	39	2
	158	5	187	2

The provision for warranty reflects the estimated costs of replacement and free-of-charge services that will be incurred by the Group with respect to products sold. The changes in the provision for warranty are as follows:

amounts in USD million

	2004	2003	2002
Balance as of January 1	10	9	7
Additions	16	10	6
Utilizations	(11)	(10)	(1)
Releases	-	-	(4)
Translation differences	1	1	1
Balance as of December 31	16	10	9

23. Long-term and short-term debt

Long-term debt in multi-currencies comprise:

amounts in USD million

	Range of interest rates	Average rate of interest	Amount outstanding at December 31, 2004	Years of maturity	Amount outstanding at December 31, 2003
Long-term bank loans	2.72 - 7.83%	4.43%	928	2 to 4 years	226
Other	2.50 - 4.79%	4.66%	289	2 to 10 years	267
			1,217		493
Less: current portion			(140)		(50)
			1,077		443



In July 2002, a private placement of EUR200 million Floating Rate Note ("FRN") due 2007 was made. These notes were issued by a wholly owned subsidiary, LG.Philips Displays Finance LLC, at par and carry a coupon rate of 2.625% per annum over the six months Euribor rate. The notes are unsecured and are listed on the Luxembourg Stock Exchange, and are guaranteed by LG.Philips Displays Holding B.V. The proceeds from the FRN issue were primarily used to fund the general working capital and restructuring projects undertaken in the Group.

Based on the loan agreements, at December 31, 2004, the long-term debt is expected to be repaid as follows in the coming five years:

amounts in USD million

Year ending December 31

2005	140
2006	188
2007	445
2008	162
2009	132
Thereafter	150
	<u>1,217</u>

The Restructuring Agreement provides the bank syndicate an enhanced security package. Various Security Interests which have been granted in favor of the agent bank of the syndicated loan facility include, among others:

1. charge over the Mandatory Prepayment Account, Cash Reserve Account and Escrow Account with the total outstanding balance of USD50 million as of December 31, 2004;
2. charge over Intellectual Property;
3. pledge of shares of certain LG.Philips Displays companies;
4. pledge of inter-company receivables of LG.Philips Displays Holding B.V. which the 2004 year-end balance was USD2,408 million;
5. pledge of real property and assets in the Netherlands, Czech, Korea, Brazil, France, Mexico and USA which the total book value was USD888 million as of December 31, 2004.

Equipment with a carrying value of USD59 million as of December 31, 2004 (2003: USD50 million) in a subsidiary in the People's Republic of China ("PRC") has been pledged as security in respect of a portion of the long-term bank loans in the amount of USD30 million (2003: USD60 million).

Short-term debt comprises:

amounts in USD million

	2004	2003
Bank loans	60	1,604
Portion of long-term debt included under current-liabilities	140	50
	<u>200</u>	<u>1,654</u>

During 2004, the weighted average interest rate on short-term bank borrowings was 3.56% (2003: 2.83%).

At December 31, 2003, the Group was in breach of certain covenants in respect of the Group's USD2,000 million syndicated loan facility. As set out in note 3, on July 14, 2004, the Group successfully completed the restructuring of the amounts outstanding under the syndicated loan agreement.



A set of new financial covenants was set up in the Restructuring Agreement based on the Group's revised long-term projections. 14 subsidiaries of LG.Philips Displays Holding B.V. are guarantors for the syndicated loan facility. The Restructuring Agreement also includes various monitoring, reporting and enforcing mechanisms to ensure the full protection of lenders' rights under the syndicated loan facility. Upon the occurrence of an event of default, the lenders can choose to declare the outstanding syndicated loan immediately due and payable and exercise their rights under various security agreements with the Group.

The Group has opened a Mandatory Prepayment Account, Cash Reserve Account and Escrow Account with the agent bank of the bank syndicate and pledged them to the agent bank for debt service purpose. The proceeds from certain asset disposals, certain new (long term) debt financings, among others, etc. as well as the excess cash over USD130 million from the annual ending cash balance of the Group except subsidiaries in the PRC and Barcelona shall be deposited to the Mandatory Prepayment Account. If the outstanding credit balance of the Mandatory Prepayment Account is above USD5 million at the end of any interest period, the agent bank shall apply the balance for the syndicated loan prepayment according to the procedures set forth in the Restructuring Agreement. The Group is not allowed to withdraw proceeds from these accounts for any purpose other than debt service.

Property, plant and equipment with a carrying value of USD82 million as of December 31, 2004 (2003: USD67 million) in a subsidiary in the PRC comprising buildings, land use rights and equipment have been pledged as security in respect of a portion of short-term bank loans in the amount of USD42 million (2003: USD76 million).

At December 31, 2004, LG.Philips Displays Holding B.V. guarantees USD30 million short-term loans borrowed by one subsidiary in the PRC in favor of the Korea Development Bank.

Accounts receivable with a carrying amount of USD9 million as of December 31, 2004 (2003: USD39 million) has been pledged as security in respect of USD9 million receivable discounting on recourse basis (2003: USD39 million).

At the end of 2004, the Group has approximately USD256 million available and unused short-term uncommitted loan facilities in China and Korea. The Group is not paying any commitment fee for these unused loan facilities.

24. Pensions and other post-retirement benefits

(a) Defined benefit pension plans

Operations of the Group located in Brazil, Germany and Taiwan have defined benefit pension plans covering certain qualified employees. The assets of the plans are held separately from those of the Group. The Group contributes, as necessary, an amount determined by reference to actuarial valuations. Pension costs in respect of defined-benefit pension plans primarily represent the increase in the actuarial present value of the obligation for pension benefits based on employee service during the year and the interest on this obligation in respect of employee service in previous years, net of the expected return on plan assets.

(b) Multi-employer pension plans

Certain employees of operations of the Group located in the Netherlands, the United States of America, the United Kingdom (excluding operations in Wales), Austria and France participate jointly with employees of Philips in the defined benefit pension plans established in the relevant jurisdictions by Philips (the "multi-employer pension plans") pursuant to the service level agreements between the Group and Philips. Under the pension plan arrangements, pension plan assets in respect of the Group's employees are not segregated from those in respect of Philips' employees and the plans are accounted for as multi-employer plans. The amounts of pension contributions made by the Group are determined by reference to Philips consulting actuaries. Pension contributions paid and due for the year are charged to the statement of operations as pension costs.



(c) Defined contribution pension arrangements

Defined contribution pension plans covering qualified employees are in place for operations of the Group located in Hong Kong, China, Korea, Slovakia, Czech Republic and Singapore. Pension contributions are determined based on either specific rates set out in the rules of the relevant pension plans or local regulatory requirements. The amount of pension contributions paid and due for the year are charged to the statement of operations as pension costs.

(d) Defined benefit post-retirement plans

The Group offers defined benefit post-retirement plans in United States of America and Brazil to provide benefits for retirees and eligible dependents. Certain employees may become eligible for such postretirement benefits upon reaching retirement age. Contributions made by the Group are determined by reference to independent actuarial valuations. The net periodic costs are recognized as employees render the services necessary to earn the post-retirement benefits.

(e) Other post-employment benefits plans

In certain jurisdictions the Group also offers post-employment benefits or severance plans to eligible employees upon voluntary terminations. The amount of benefits is determined based on the Group's employee benefits policies in the relevant locations and is generally based on the employees' years of service with the Group. The costs of such benefits are accrued and charged to the statement of operations in the year when employees of these locations become eligible.

The measurement date for most defined benefit plans is December 31.

Provided below is a table with a summary of the changes in the pension benefit obligations and defined pension plan assets for 2004 and 2003, and a reconciliation of the funded status of these plans to the amounts recognized in the consolidated balance sheets.

Also provided below is a table with a summary of the changes in the accumulated postretirement benefit obligations and plan assets for 2004 and 2003, and a reconciliation of the obligations to the amounts recognized in the consolidated balance sheets.

*amounts in USD million***Benefit obligation**

	2004	2003	2004	2003
	Pension benefits		Postretirement benefits	
Benefit obligation as of January 1,	41.9	29.1	46.4	37.4
Service cost	0.4	0.6	0.2	0.3
Interest cost	5.2	3.6	3.8	3.4
Actuarial loss	3.4	1.5	13.4	4.5
Benefit paid	(3.4)	-	(3.1)	(1.2)
Exchange rate differences	3.8	7.1	1.5	2.0
Benefit obligation as of December 31	51.3	41.9	62.2	46.4

*amounts in USD million***Plan assets**

	2004	2003	2004	2003
	Pension benefits		Postretirement benefits	
Fair value of plan assets as of January 1,	39.7	26.8	-	-
Actual return on plan assets	6.4	5.7	-	-
Employee contributions	-	0.1	-	-
Employer contributions	0.5	0.4	-	-
Benefit paid	(3.4)	-	-	-
Exchange rate differences	3.5	6.7	-	-
Fair value of plan assets as of December 31,	46.7	39.7	-	-
Funded status	(4.5)	(2.2)	(62.2)	(46.4)
Unrecognized prior service cost	0.3	0.4	0.3	0.3
Unrecognized net (gain) loss	-	(2.0)	21.1	7.4
Net balance	(4.2)	(3.8)	(40.8)	(38.7)
Classification of the net balances is as follows:				
- Prepaid pension costs under non-current receivable	4.9	3.2	-	-
- Provisions for pensions under provisions	(9.1)	(7.0)	(40.8)	(38.7)
	(4.2)	(3.8)	(40.8)	(38.7)

Information for pension plans with accumulated benefit obligation in excess of plan assets*amounts in USD million*

	2004	2003
Projected benefit obligation	9.1	7.0
Accumulated benefit obligation	8.8	6.1
Fair value of plan assets	-	-

Total accumulated benefit obligation for pension benefits was USD50.0 million as of December 31, 2004 (2003: USD40.1 million).



The components of net periodic pension costs of major defined-benefit and post-retirement plans were as follows:

	2004	2003	2002	2004	2003	2002
	Pension benefits			Post-retirement benefits		
Service cost-benefits earned during the period	0.4	0.6	0.6	0.2	0.3	0.3
Interest cost on the projected benefit obligation	5.2	3.6	3.8	3.8	3.4	3.1
Expected return on plan assets	(6.0)	(3.7)	(4.5)	-	-	-
Net actuarial loss recognized	-	0.7	-	0.4	0.3	-
Other	0.1	0.1	3.1	-	0.1	-
Net periodic pension cost	(0.3)	1.3	3.0	4.4	4.1	3.4

The Group used the following assumptions, calculated based on weighted average, to measure the benefit obligations at December 31 as follows:

	2004	2003	2004	2003
	Pension benefits		Post-retirement benefits	
Discount rate	10.7%	12.0%	7.6%	7.5%
Rate of compensation increase	5.8%	6.7%	1.9%	1.5%

The Group used the following assumptions, calculated based on weighted average, to measure the net periodic benefit cost for years ended December 31 as follows:

	2004	2003	2004	2003
	Pension benefits		Post-retirement benefits	
Discount rate	12.0%	10.9%	7.5%	7.9%
Rate of compensation increase	6.7%	5.4%	1.5%	1.4%
Expected long-term return on plan assets	14.5%	12.8%	-	-

Assumed healthcare cost trend rates at December 31:

	2004	2003
Healthcare cost trend rate assumed for next year	7.7%	9.6%
Rate that the cost trend rate will gradually reach	6.0%	6.0%
Year that the rate reaches the rate it is assumed to remain at	2008	2008

Assumed healthcare cost trend rates have a significant effect on the amounts reported for the healthcare plans. A one-percentage-point change in assumed healthcare cost trend rates would have the following effects:

	1- Percentage- Point Increase	1- Percentage- Point Decrease
Effect on total of service and interest cost	0.9	(0.7)
Effect on post-retirement benefit obligation	8.9	(7.8)

The Group also sponsors defined-contribution and similar-type plans for a significant number of salaried employees. The total cost of these plans amounted to USD5.7 million (2003: USD4.6 million; 2002: USD0.7 million). The contributions to the multi-employer plans amounted to USD14.6 million in 2004 (2003: USD14.2 million; 2002: USD11.0 million).



As of December 31, 2004, the following benefit payments, which reflect expected future services, as appropriate, are expected to be paid:

	Pension benefits	Post- retirement benefits
2005	3.6	3.6
2006	3.9	3.8
2007	4.2	4.0
2008	4.4	4.3
2009	4.7	4.6
Thereafter	26.8	23.1
	47.6	43.4

Contributions expected to be paid to the pension benefits plan during the next fiscal year are USD0.5 million.

The investment strategy for the plan assets (based on the Investment Policy Statement) in general is annually determined by the Administrative Committee and approved by the Board of Directors of the pension fund. The investment policy sets out the target strategic allocations for each asset class considered, the ranges for tactical asset allocation, risks budgets, and other investment guidelines for the investment manager, such as benchmarks and target credit ratings.

The pension fund invests in the local equity and fixed income markets, as well as the commercial real estate market. Derivatives are used to achieve exposure to certain less liquid assets that would otherwise be difficult to negotiate. Additionally, they are used to effect quick changes in tactical asset allocation and duration, and may also be used to limit the plan's exposure to interest rate risk and currency exchange risk on investments. In order to keep the fund's investment strategy in balance with the structure of its pension benefit obligation, asset-liability reviews are carried out periodically. The structure of the pension benefit obligation, expectations and scenarios with regard to the long-term rate of return on assets, acceptable ranges for contributions and risk parameters are the input for these reviews.

The expected long-term rates of return on assets are based on scenario analysis of the development of the global economy and consequently the development of financial markets.

The Group's pension plan asset allocation at December 31, 2004 and November 30, 2003 and target allocation 2005 is as follows:

Asset category	Target allocation		
	2005	2004	2003
Equity securities	3%	5%	4%
Debt securities	70%	64%	66%
Real estate	24%	28%	27%
Other	3%	3%	3%
	100%	100%	100%



25. Disposal of subsidiaries

During 2003, the group disposed certain interests of its subsidiaries for USD21 million, satisfied in cash.

amounts in USD million

Net assets disposed

	2003
Accounts receivable	(4)
Inventories	(18)
Other current assets	(11)
Property, plant and equipment	(2)
Accounts payable	6
Other provisions and liabilities	23
Other non-current liabilities	21
Net identifiable liabilities	15
Total proceeds received, satisfied in cash	21
Gain in respect of the disposal of subsidiaries	36

26. Financial instruments and risks

The Group runs a global business. Hence, it is exposed to global market risks, including currency risk, interest rate risk, commodity risk and credit risk.

The Group does not purchase or hold derivative financial instruments for trading purposes.

Currency risk

The Group's functional currency is the US dollar. The Group has a significant proportion of its revenues and costs denominated in Euros, Pound Sterling, Chinese Yuan and Korean Won as it has substantial presence in terms of sales, production, administration and design and engineering in Europe, China and Korea. Consequently, fluctuations in Euros, Pound Sterling, Chinese Yuan and Korean Won against the US dollar can have a material impact on the Group's financial results.

The Group is exposed to currency risks in the following areas: -

- Transaction exposure arising from transactions denominated in currencies other than the Group's functional currency, such as existing and forecast sales and purchases, and account receivables and payables;
- Translation exposures of non-functional-currency-denominated debt of the Group;
- Translation exposures of non-functional-currency-denominated intercompany loans to the its subsidiaries; and
- Translation exposures of non-functional-currency-denominated equity investments.

The Group has adopted the following Risk Management Policy: -

Hedging is allowed for transaction exposures denominated in currencies other than the functional currencies of the local organizations. Local treasury managers and/or financial controllers are responsible for identifying, measuring and arranging hedges for the foreign currency exposures arising from material transactions. Forwards are allowed to be used to hedge committed and anticipated foreign currency exposures. Generally the maximum tenor of the hedges is less than 12 months.

The Group does not hedge the foreign currency exposures arising from translation exposures.

The Group does not hedge the foreign currency exposures arising from non-functional-currency-denominated equity investments.



Interest rate risk

At December 31, 2004, the Group had USD1,092 million of external floating debt. The Group has not employed any hedges for the floating debt and there were no outstanding interest rate swaps at year-end 2004.

Commodity price risk

The Group purchases certain base metal (such as copper) and precious metal. To mitigate the commodity price risks, the Group employs derivatives to hedge such risks. The commodity price derivatives are entered into as cash flow hedges to offset forecast purchases. There were no commodity derivative contracts outstanding at year-end 2004.

Credit risks

The Group encounters credit exposure to its customers with respect to the receivables and the financial institutions with respect to derivative financial instruments, borrowing and cash deposits. The Group did not experience any significant loss arising from payment failure by its customers as the Group performs ongoing credit evaluations of the financial conditions of its customers. As of December 31, 2004, the Group had credit risks, based on the gross fair value of the financial transactions, exceeding USD10 million to the following number of counterparties.

	USD10 – 25 million	> USD25 million
AA rated bank counterparties	1	1
A rated bank counterparties	-	2
Lower rated bank counterparties	3	3

To protect both the financial institutions and the Group, it is the Group's policy to execute an ISDA (International Swap Dealers Association) master agreement prior to entering any derivatives with the financial institutions. Wherever possible, cash is placed in financial institutions with strong credit ratings.



Fair value of financial assets and liabilities

The estimated fair value of financial instruments has been determined by the Group using available market information and appropriate valuation methods. The carrying amounts of cash and cash equivalents, accounts receivable and accounts payable approximate their fair value due to their short maturities. The fair value of the derivative instruments and financial assets is based on their estimated market price. The carrying amount of debts approximates their fair value as the debts are predominantly floating rate or short-term.

Amount in USD million	December 31, 2004		December 31, 2003	
	Carrying Amount	Estimated fair value	Carrying Amount	Estimated fair value
Assets:				
Cash and cash equivalents	113	113	322	322
Accounts receivable	389	389	445	445
Pledged deposits	50	50	-	-
Other financial assets	-	-	13	13
Liabilities:				
Accounts payable	(677)	(677)	(674)	(674)
Debt	(1,277)	(1,277)	(2,097)	(2,097)
Derivative instruments	-	-	(31)	(31)

27. Commitments & Contingencies

Litigation

The Group is subject to various ongoing and pending lawsuits and claims at December 31, 2004 that management believes to be insignificant. The Group intends to vigorously contest the liability in all such matters brought against the Group. While no assurance can be given as to the ultimate outcome of such lawsuits, the directors are of the opinion that such litigation will not have a material adverse effect on the results of operations or the financial position of the Group.

28. Subsequent events

On March 2, 2005, the Group announced the closure of its Durham (UK) plant due to heavy price erosion and drop in demand for medium sized tubes. The factory is expected to cease operations by end of July 2005. The related closure costs will amount to approximately USD43 million and the closure will be completed in 2005.

On March 24, 2005, the Chinese authorities approved the merger of Hua Fei Colour Display Systems Co., Ltd. and Nanjing Huapu Electronics Co., Ltd., which companies are both for 55% owned by the Group. The merger is expected to be completed in 2005 and will not change the Group's shareholding interest.

29. Acquisition of subsidiaries

During 2004, the Group acquired the remaining 90% shareholding in Barayo from Business Creation Industries B.V. ("BCI") subject to certain conditions. These conditions were satisfied and the purchase was consummated on October 19, 2004, on which date the Group became the sole shareholder (100%) of Barayo. Thus, the Group has consolidated Barayo's results from October 19, 2004.



The excess of the consideration over the fair value of the assets and liabilities assumed, amounting to USD50 million, was expensed as the Group has committed and intends to close the operations of Barayo. As the Group had previously held a 10% shareholding in Barayo, the Group retroactively consolidated 10% of Barayo's results in 2003 and 2004 until the acquisition date by accounting for the Group's 10% of the shareholding in Barayo according to the equity method, following provision of ARB 51. As a result thereof, the Group recorded a loss of EUR2 million (equivalent to USD3 million) and EUR3 million (equivalent to USD3 million) in the Consolidated Statement of Operations for the year 2004 and consolidated retained earnings, respectively.

On February 3, 2005, the Group announced the closure of its Barayo plant in Spain. The number of employees affected is around 360.



30. Summary of Operating Segments

The Group's business units have been segregated and internally reported by management into three major reportable segments comprising CPT, CDT, and Comp. Its CPT segment for television sets and CDT segment for computer monitors serve global customers from various regions. The components segment includes Glass, Deflection Yoke, Electron Gun and Yoke Rings.

Product Segment

amounts in USD million

For the year ended December 31, 2004

	Total	CPT	CDT	COMP	Corporate and other
Total sales including internal sales	4,673	2,870	1,027	776	-
Internal sales	(626)	-	-	(626)	-
Net total sales to third parties	4,047	2,870	1,027	150	-
% of net third parties' sales	100%	70.9%	25.4%	3.7%	-
(Loss)/ profit from operations	(42)	(75)	109	(52)	(24) ⁽¹⁾
% of net third parties' sales	-1.0%	-2.6%	10.6%	-34.7%	
Capital expenditure	137	91	14	32	-
Long-lived assets	1,873	1,409	304	160	-
Total assets	2,991	2,000	489	275	227 ⁽¹⁾

amounts in USD million

For the year ended December 31, 2003

	Total	CPT	CDT	COMP	Corporate and other
Total sales including internal sales	4,705	2,862	969	874	-
Internal sales	(739)	-	-	(739)	-
Net total sales to third parties	3,966	2,862	969	135	-
% of net third parties' sales	100%	72.2%	24.4%	3.4%	-
(Loss)/ profit from operations	(820)	(498)	(168)	(166)	12 ⁽¹⁾
% of net third parties' sales	-20.7%	-17.4%	-17.3%	-123.0%	
Capital expenditure	208	105	20	83	-
Long-lived assets	2,014	1,425	341	248	-
Total assets	3,422	1,995	588	414	425 ⁽¹⁾



amounts in USD million

For the year ended December 31, 2002

	Total	CPT	CDT	COMP	Corporate and other
Total sales including internal sales	5,393	2,999	1,201	1,193	-
Internal sales	(991)	-	-	(991)	-
Net total sales to third parties	4,402	2,999	1,201	202	-
% of net third parties' sales	100%	68.1%	27.3%	4.6%	-
(Loss)/ profit from operations	(405)	(165)	(223)	(40)	23 ⁽¹⁾
% of net third parties' sales	-9.2%	-5.5%	-18.6%	-19.8%	-
Capital expenditure	442	295	97	50	-
Long-lived assets	2,843	1,897	602	344	-
Total assets	4,349	2,621	827	701	200 ⁽¹⁾

(1) Unallocated income/ (loss) includes general and administrative expenses in the corporate office and research centres as well as net general service fee recovered from product segments, net of amounts incurred. Unallocated total assets primarily relate to cash.

Geographical Area

amounts in USD
million

For the year ended December 31, 2004

	Total	Netherlands	China	Korea	America	Brazil	Others
Total sales including internal sales	6,034	1,031	1,366	1,405	376	532	1,324
Internal sales	(1,987)	(74)	(183)	(290)	(55)	(280)	(1,105)
Net total sales to third parties	4,047	957	1,183	1,115	321	252	219
% of net third parties' sales	100%	23.7%	29.2%	27.6%	7.9%	6.2%	5.4%
Long-lived assets	1,873	4	632	509	8	108	612
Total assets	2,991	191	1,073	695	66	175	791



amounts in USD
million

For the year ended December 31, 2003

	Total	Netherlands	China	Korea	America	Brazil	Others
Total sales including internal sales	5,874	888	1,351	1,304	310	415	1,606
Internal sales	(1,908)	(90)	(170)	(269)	(21)	(252)	(1,106)
Net total sales to third parties	3,966	798	1,181	1,035	289	163	500
% of net third parties' sales	100%	20.1%	29.8%	26.1%	7.3%	4.1%	12.6%
Long-lived assets	2,014	21	702	536	18	120	617
Total assets	3,422	319	1,125	840	85	172	881

amounts in USD
million

For the year ended December 31, 2002

	Total	Netherlands	China	Korea	America	Brazil	Others
Total sales including internal sales	6,592	744	1,138	1,604	460	362	2,284
Internal sales	(2,190)	(276)	(167)	(441)	(41)	(179)	(1,086)
Net total sales to third parties	4,402	468	971	1,163	419	183	1,198
% of net third parties' sales	100%	10.6%	22.1%	26.4%	9.5%	4.2%	27.2%
Long-lived assets	2,843	31	894	683	191	146	898
Total assets	4,349	228	1,283	1,001	280	188	1,369



31. Company-level unconsolidated financial information

Unconsolidated Company-level Statements of Operations for the year ended December 31, 2004, 2003 and 2002

amounts in USD million

	Note	2004	2003	2002
REVENUE				
Interest income	A	\$ 84	\$ 74	\$ 88
Other revenue		50	42	34
		134	116	122
EXPENSES				
General and administrative expenses		(53)	(64)	(39)
Research & development expenses		(5)	(5)	(5)
Finance expenses	B	(48)	(56)	(72)
Loss on disposal of a subsidiary		-	(21)	-
Other expenses		(3)	(7)	-
Exchange differences		62	54	(35)
		(47)	(99)	(151)
Profit/ (loss) from operations		\$ 87	\$ 17	\$ (29)
Income taxes		(1)	(1)	(2)
Profit/ (loss) after income taxes		\$ 86	\$ 16	\$ (31)
Share of net losses of subsidiaries	C	(257)	(888)	(501)
Net Loss		\$ (171)	\$ (872)	\$ (532)

Loss after income taxes and share of net losses of subsidiaries in 2002 did not include USD254 million in respect of a waiver of loans due from subsidiaries to the Company. There would be no net impact on amount of net loss for that year disclosed above in respect of such presentation.

**Company-level unconsolidated balance sheets at December 31, 2004 and 2003***amounts in USD million, except for share figures***ASSETS**

Current assets:

Cash and cash equivalents

Accounts receivable, less allowance for doubtful
accounts (nil in 2003 & 2004)

Non-current assets:

Pledged deposits

Investment in, and loans to subsidiaries

Other non-current assets

TOTAL ASSETS**LIABILITIES AND STOCKHOLDERS' EQUITY**

Current liabilities:

Accounts payable

Short-term debt (including current portion of long-term
debt)

Total current liabilities

Long-term debt

TOTAL LIABILITIES

Stockholders' equity/ (deficit)

Common stock, par value EUR1 per share

Authorized: 90,000 shares

Issued and outstanding: 68,182 shares (2003:
68,182 shares)

Share premium

Accumulated losses

Other comprehensive income

Stockholders' equity/ (deficit)

TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY

Note

2004

2003

		\$ 16	\$ 128
		1	13
		50	-
D		958	1,270
		-	11
		\$ 1,025	\$ 1,422
		\$ 11	\$ 54
E		50	1,433
		61	1,487
E		673	-
		\$ 734	\$ 1,487
		2,040	1,546
		(1,926)	(1,752)
		177	141
		\$ 291	\$ (65)
		\$ 1,025	\$ 1,422



Company-level unconsolidated Statements of Changes in Stockholders' Equity/ (Deficit) and Comprehensive Income/ (Loss) for the years ended December 31, 2004, 2003 and 2002

<i>amounts in USD million, except for share figures</i>	Number of shares issued, EUR 1 par value per share	Common stock	Share premium	Accumu- lated losses	Accumu- lated other comprehens- ive income/ (loss)	Total Stock- holders' equity/ (deficit)
Balance at January 1, 2004						
As previously reported	68,182	-	1,546	(1,752)	141	(65)
Adjustment arising from acquisition of subsidiaries		-	-	(3)	-	(3)
As adjusted	68,182	-	1,546	(1,755)	141	(68)
Capital contribution on July 14, 2004 (net of capital duty of USD6 million)	-	-	494	-	-	494
Net loss for the year	-	-	-	(171)	-	(171)
Translation adjustments	-	-	-	-	36	36
Balance at December 31, 2004	68,182	-	2,040	(1,926)	177	291
Balance at January 1, 2003	68,182	-	1,546	(880)	150	816
Net loss for the year	-	-	-	(872)	-	(872)
Translation adjustments	-	-	-	-	(9)	(9)
Balance at December 31, 2003	68,182	-	1,546	(1,752)	141	(65)
Balance at January 1, 2002	49,998	-	1,296	(348)	22	970
Share capital issued on May 31, 2002	18,184	-	250	-	-	250
Net loss for the year	-	-	-	(532)	-	(532)
Translation adjustments	-	-	-	-	128	128
Balance at December 31, 2002	68,182	-	1,546	(880)	150	816

Note: Total loss and other comprehensive income/ (loss) for the year amounted to USD135 million (2003: USD881 million; 2002: USD404 million).



Company-level unconsolidated Cash Flow Statements for the years ended December 31, 2004, 2003 and 2002

amounts in USD million

	2004	2003	2002
Net cash provided by/ (used in) operating activities	\$ 16	\$ 72	\$ (23)
Cash flows – investing activities			
Net changes in investment in subsidiaries	89	(52)	(41)
Cash flows – financing activities			
Net increase/ (decrease) in short-term debt	-	285	(35)
Long-term debt			
Repayment of long-term debt	(711)	(217)	(350)
Payment of debt issuance costs	-	-	(2)
Proceeds from additional paid-in capital	500	-	250
Payment of capital duty related to previous and current years' additional paid-in capital	(6)	-	-
Net cash (used in)/ provided by financing activities	\$ (217)	\$ 68	\$ (137)
Net change in cash and cash equivalents	(112)	88	(201)
Cash and cash equivalents as of January 1	128	40	241
CASH AND CASH EQUIVALENTS AS OF DECEMBER 31	\$ 16	\$ 128	\$ 40
Net cash paid during the year for:			

	2004	2003	2002
Interest paid	35	43	58
Income taxes	-	-	-

Notes:

	2004	2003	2002
Cash flows - operating activities			
Net loss	\$ (171)	\$ (872)	\$ (532)
Adjustments to reconcile net loss to cash provided by/ (used in) operating activities:			
Loss on disposal of a subsidiary	-	21	-
Share of net losses of subsidiaries	257	888	501
Increase in pledged deposits	(50)	-	-
Decrease/ (increase) in accounts receivable	12	(13)	-
Decrease in other current and non-current assets	11	11	9
(Decrease)/ increase in accounts payable	(43)	37	(1)
Net cash provided by/ (used in) operating activities	\$ 16	\$ 72	\$ (23)



Notes to the financial information of LG.Philips Displays Holding BV

With respect to the Company's accounting policies and other information, refer to notes to the consolidated financial statements, which should be read in conjunction with the information contained in these notes.

A. Revenue

Interest income includes intercompany interest charged to subsidiaries of USD82 million (2003: USD73 million; 2002: USD86 million). Other revenue represents general administrative service fees receivable from subsidiaries.

B. Finance expenses

Finance expenses include interest expenses and amortization of deferred financing costs as follows:

amounts in USD million

Interest paid to third parties

Amortization of bank loan facility arrangement fee

2004	2003	2002
35	43	58
13	13	14
48	56	72

C. Share of net losses of subsidiaries

Share of net losses of subsidiaries includes net tax credit of USD17 million (2003: USD19 million, 2002: USD5 million).

D. Investment in, and loans to, subsidiaries

The Company's investments represent investments in subsidiaries and are accounted for in the company level using the equity method of accounting taking account of net assets of subsidiaries as at the year/period ended attributable to the Company. A judgmental aspect of accounting for investments involves determining whether an other-than-temporary decline in value of the investment has been sustained. If it has been determined that an investment has sustained an other-than-temporary decline in its value, the investment is written down to its estimated recoverable amount, by a charge to earnings. Such evaluation is dependent on the specific facts and circumstances. In the opinion of the management, no factors indicative of an other-than-temporary decline in value of the Company investments has occurred and which is based, in part, on the basis that the Group continues to operate as a going concern (refer to note 3).

E. Short-term and Long-term debt

Both short-term and long-term debts relate to amounts borrowed under the USD2,000 million syndicated loan facility. Short-term debt represents the current loan portion. At December 31, 2004, the long-term debt is expected to be repaid as follows:

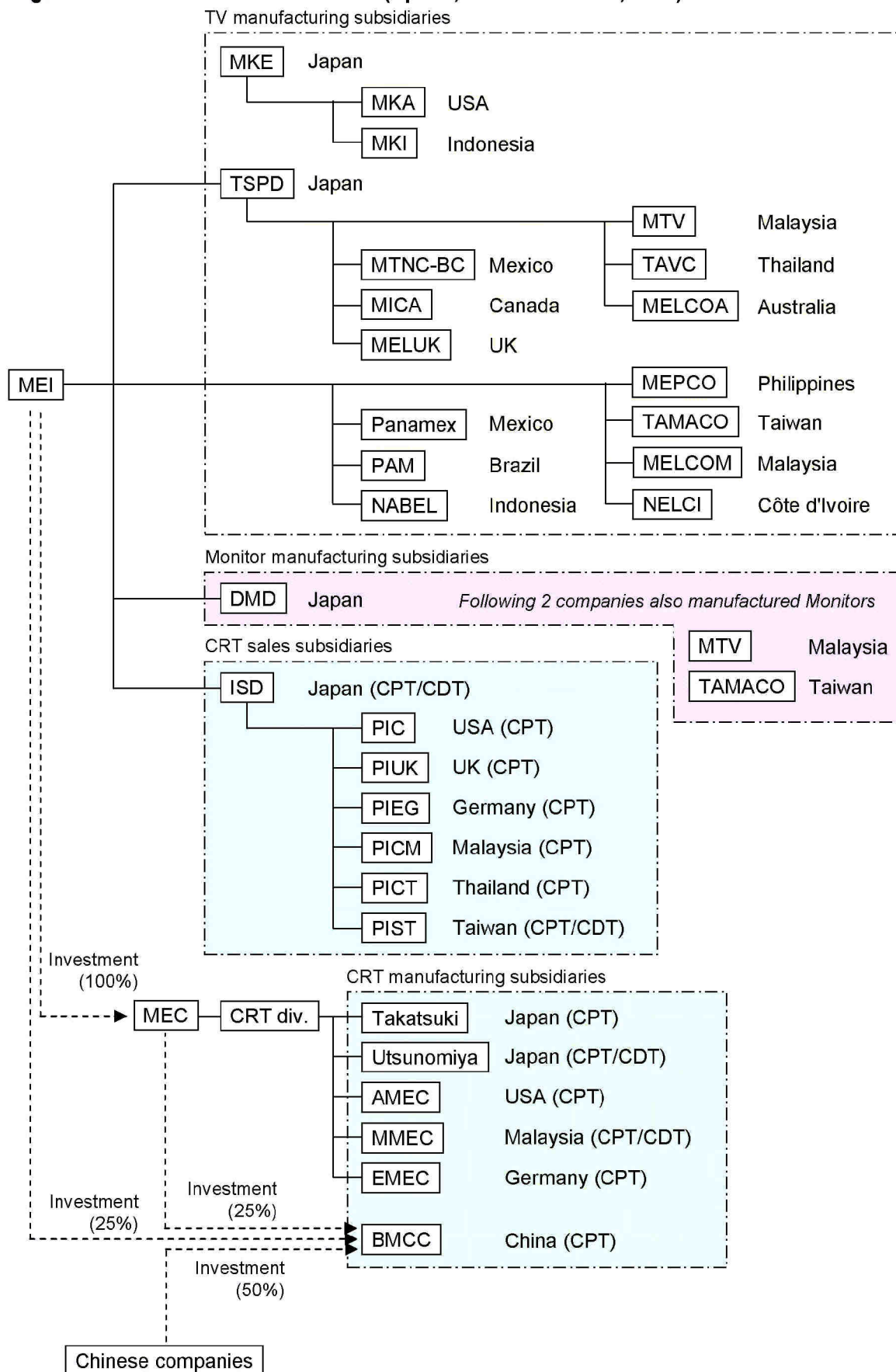
amounts in USD million

Year ending December 31

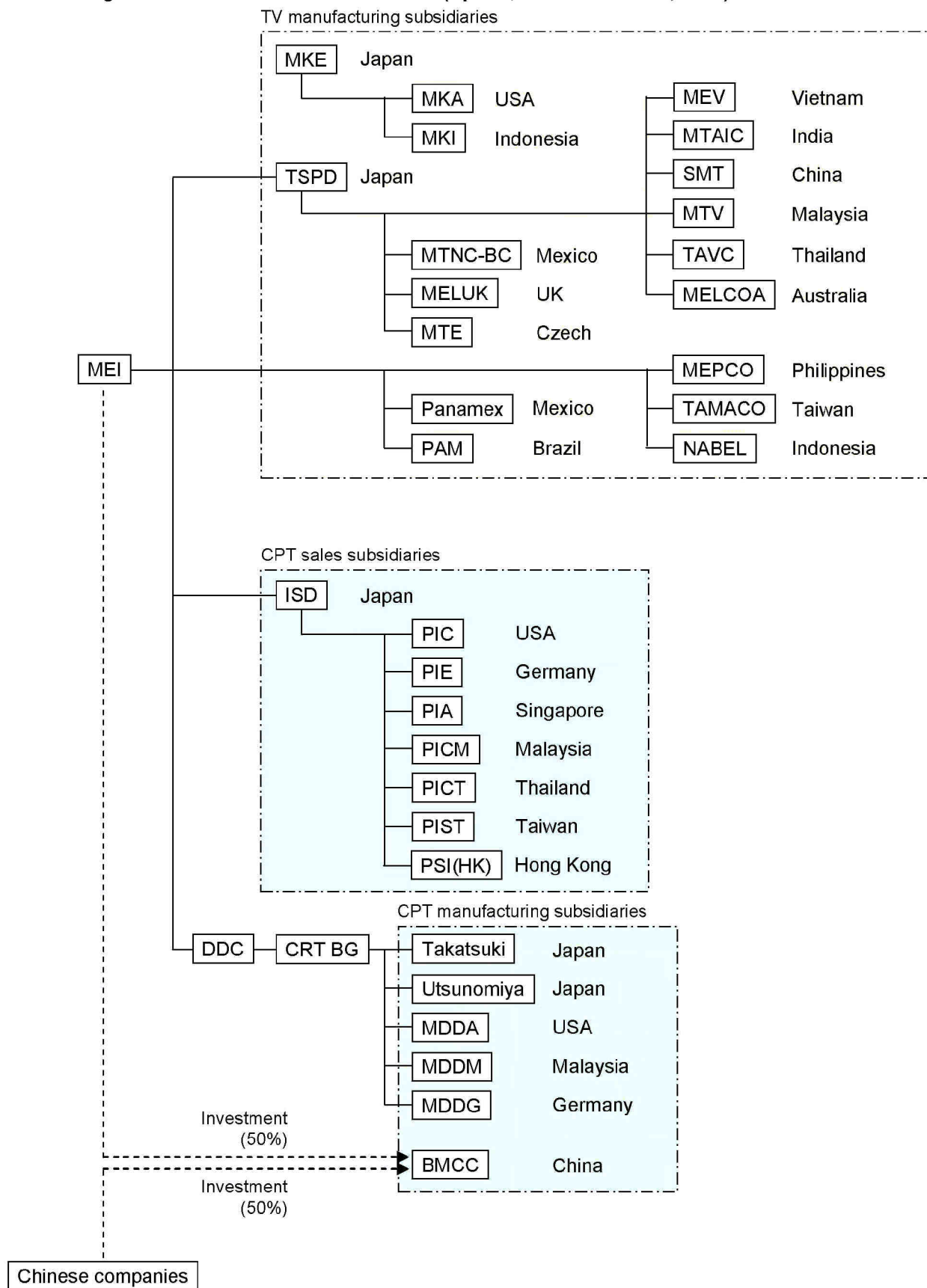
2005	50
2006	90
2007	160
2008	160
2009	120
Thereafter	143
	723

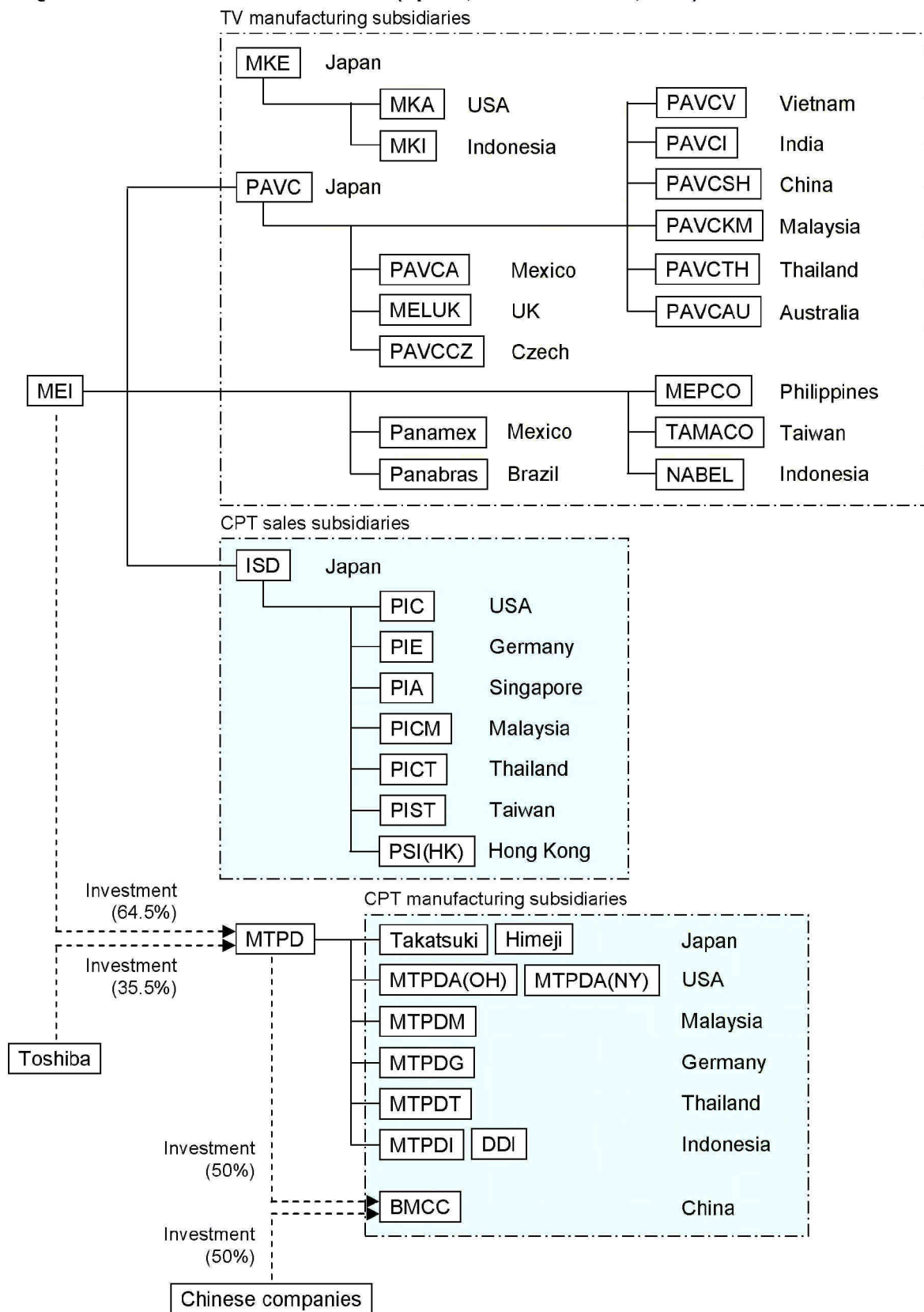
EXHIBIT 25

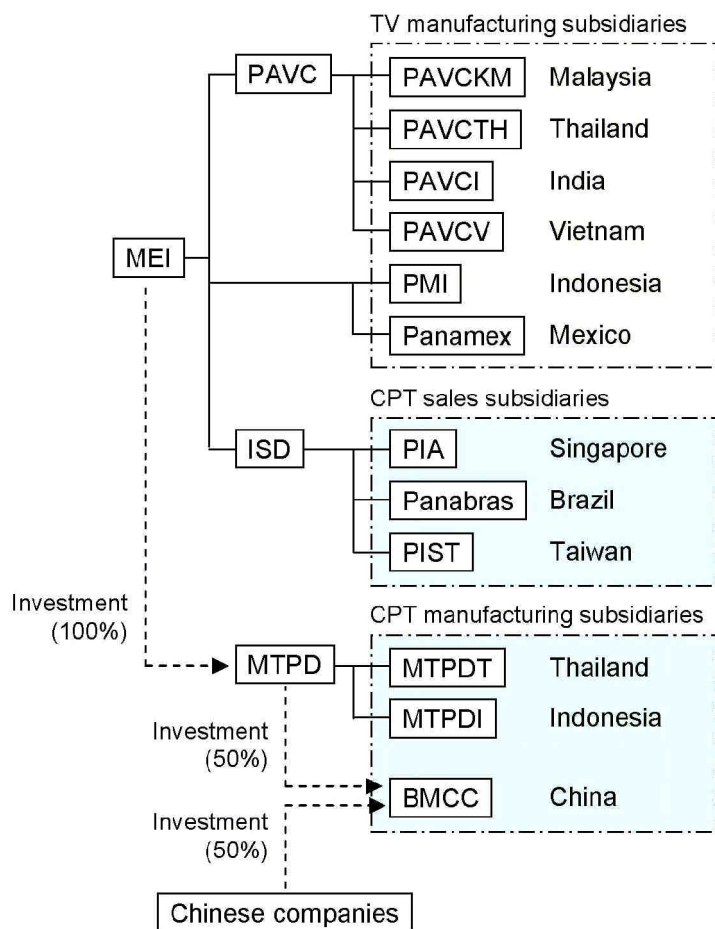
Overview of legal entities that have dealt with CRT (April 1, 1995 – March 31, 2001)



Overview of legal entities that have dealt with CRT (April 1, 2001 – March 31, 2003)



Overview of legal entities that have dealt with CRT (April 1, 2003 – March 31, 2007)

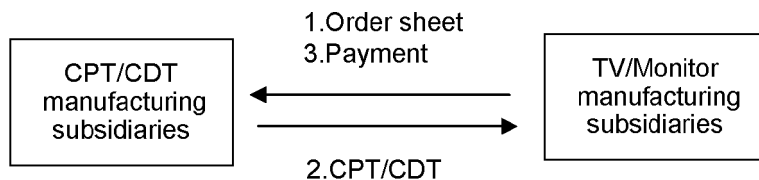
Overview of legal entities that deal with CRT (as of April 1, 2007)

Abbreviations:

BMCC: Beijing-Matsushita Color CRT Co., Ltd.
 DDC: Display Devices Company
 DMD: Display Monitor Division
 ISD: Corporate Industrial Marketing & Sales Division
 MEC: Matsushita Electronics Corporation
 MEI: Matsushita Electric Industrial Co., Ltd.
 MKE: Matsushita Kotobuki Electronics Co., Ltd.
 MTPD: Matsushita Toshiba Picture Display Co., Ltd.
 PAVC: Panasonic AVC Networks Company
 TSPD: TV System Products Division

Overview of two types of intra-group sales relationships between MEI legal entities

(1) Between “CPT/CDT manufacturing subsidiaries” and “TV/Monitor manufacturing subsidiaries”



(2) Between “CPT/CDT manufacturing subsidiaries” and “CPT/CDT sales subsidiaries”

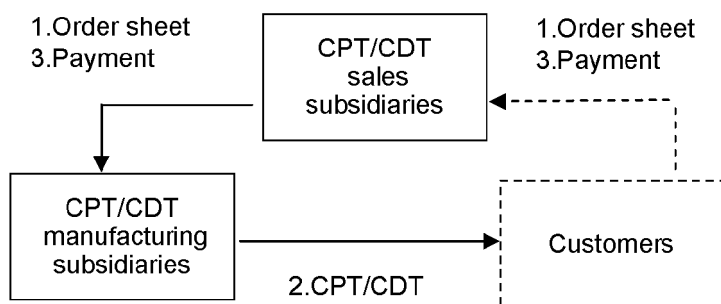


EXHIBIT 26

Document Produced in Native Format

File Name: 30131+W_W_line.xls

File Path: \\10.0.0.252\g\$\Projects\Apple\ToBeProcessed\Albertazzi_Felice\Norton Ghost image\NTFS - SYSTEMA\OCT 2002-APR 2003\archive2.nsf;AllDocuments\C972CC97474F1F8AC1256E13002ED1A0;30131+W_W_line.xls

File Size: 163840

F-LG CRT LINE STATUS

* D : CDT

Drop/New

Jan.2002 updated <CAPA:KP/M>

Country	Site	Line	Products	CPT	Remarks
Korea	Kumi	F-1	D:19/19ez		19F to be added from Apr.'02 Restart from Sep.'02 with 17" Flatron Started from Nov.'01 after fire. Batch production. To be moved to Changsa from 3Q,'02.
		F-2	D:17F, 19F		
		G-1	D:17F		
		G-2	D:17/17ez		
		T	19F		
		J	25F/29/29F	140	
		W	29/29F/33/W:28-32	135	
	Total			275	CPT maxi CAPA:280k/m
	Changwon	H-1	20/21/21FCD	200	19" available
		H-2	D:17ez		
		H-3	D:17		
		H-5	D:15, 15"RF	3	
Total			203	CDT July loading: 85%?	
Total			478		
China (LGESG)	Changsa	#1	21	185	25RF M-P to start Mar.'02. 29CV,29SF,29RF,29RF-single focus(Feb.'02) Aug.,'01. Start, 17"ez starts from Apr.'02. Gumi T line. To start from 2Q,'03 after reinstallaton.
		#2	21",25", 25RF	160	
		#3	29/29F	140	
		#4	D:15/17/17ez		
		#5	17/17ez/17F		
	Total			485	
Indonesia (LGEDI)	Jakarta	#1	14	220	Slow in Jan~Feb.'03.
		#2	20/21	205	
	Total			425	
UK (LGEWA)	Wales	#1	D:15/17/17ez		
		#2	21/D:17	150	
	Total			150	
LG TOTAL				1538	

F-PHILIPS CRT LINE STATUS

* D : CDT		Drop/New		Jan.2003 updated <CAPA:KP/M>		
Country	Site	Line	Products	CPT	Remarks	
China (華 飛)	Nanjing (南 京)	#1	21/21F	145	21"RF from Aug.'02., 21"RF:67k/m capa=>demand sharply dropped. Considering 21"CV if 25" is slow 0.65m/y.	
		#2	21/25	130		
		#3	29SF	75		
		1st	D:17-4pin		New line	
		2nd	D:17cyber		New line	
		#6	29F	70	29"RF from Mar. '02., Double focus first., 0.7m/y capa To be started from Jan.'03. Jan.'03:1k sold, Ramp-up from Mar.	
		#7	34RF	1		
		3rd	D:15			Old Chupei line
		4th	D:15			Old Chupei line
		5th	D:14/15			Old Chupei line
6th	D:17 Cyber		Old Chupei line, ezFlat2 from May.			
7th	D:17 4pin		Old Chupei line, 4pin type,			
Total				421		
Austria	Lebring	#1	D:17/17F		To be closed in 3Q,2002.	
		#2	D:(15)/17			
		#3	D:17			
		#4	D:17			
Total						
Germany	Aachen	#1	25	0	'00.04 move to Chez	
		#2	28WRF, 28W	80	* '02,mainly 32WRF, 36"Flat to be added in 2003	
		#3	32WRF, 36"WRF	80		
		Total				160
France	Dreux	#1	24W, WRF/28W	65	24WRF SPP in Apr., P-P in Jun. 1st 1k to PCE in July. Gumi 29FCD type considered.	
		#2	29 CV/RF	65		
		#3	28/28W	110		
		Total				240
UK	Durham	#1	21CV/RF	95		
		#2	25CV	70		
		#3	21/17	95		
		Total				260
Spain	Barcelona	#1	14	100		
		#2	14	100		
		#3	14	100		
		Total				300
USA	Ottawa (OH)	#1	25V	0	*2001 line : 6 screen line + 5 back-end line. *2002 production plan(Budget); - 25V/1,300k, 27V/84k+CMA, 32V/43k, 32VRF/307k *Closed in Dec.2002.	
		#2	27V			
		#3	25/27V			
		#4	25/27V			
		#5	27/32V			
	Gomez	A	Jumbo A (27V, 32VRF)			
		B	Jumbo B (27V)			
		C	Large L (27VRF)			
	Total				180	
	Brazil	SJC (Compos)	#1	20	100	2 phosphor line+1 back-end line. Demand quite slow in Q1,2003
#2			14	300		
#3			20	100		
#4			14/20	0	stop from Jul.'01. 300-layoff, 21"RF considered	
Total				500		
Czech	Harnice	#1	Large(28)	50	SPP in Feb. M-P delivered in Mar. Line conversion for both 32"W and WRF in Dec.'02. WSRF starts from Apr. SPP in Sep., 25k in Oct.	
		#2	Jumbo(32W/(32WRF))	50		
		#3	Jumbo(28W)	30		
		Total				130
PHILIPS TOTAL				2061		

SDI CRT LINE STATUS

* D : CDT

Drop/New

Jan. 2003 updated <CAPA:KP/M>

Country	Site	Line	Products	CPT	Remarks
Korea	Suwon	#1	10"	150	*10" Capa to be increased to over 150k/m *17" CPT planned (for Samsung TV)
		#2	D:19/19F/21F		
		#3	D:17F		
		#6	6"/7prt	8	
		total		158	6":5~10k/m=>will drop in 2003. Focus on 7"projection tube.
	Pusan	#1	21/D:19/19F	80	'00.05 17"DF added '00.08 17"DF added '01.8 17F started '01.8 17F started Temporary Shutdown(Jul., '01)
		#2	D:17F		
		#3	D:17F		
		#4	D:17F/19F		
		#5	D:17F		
		#6	D:15		
		#7	25/25F/29/29F	130	28"WRF,32"WRF=>Almost no order. 32"WF:10k/m, but 80~90% to SEC-TV.
		#8	29/29F/WF:28-32	130	
		total		340	
	Total			498	
Malaysia	Selemban	#1	14/16	220	14" total : around 93% loading. ***14" total : 2.5 line/'02 => 1.5 line/'03. Will reduce further to 1 line. 21"RF to be planned in 2003. Now full loading. 14"CPT production almost dropped, mainly 15"F CPT now. CDT production also slow down Jul., '01. 17"DF start
		#2	14	220	
		#3	20/21	200	
		#4	14/15F/ D:14	90	
		#5	D:17/17F		
		#6	D:15/17		
	Total			730	
China	Shenzhen (深圳)	#1	20/21/21F	230	TTL 21"RF: 100=>160=>300K/M to be produced (include #3 line output). Completely converted to CPT from Oct.'02 Old line moved from Suwon.
		#2	D:17F		
		#3	D:17F/21F	210	
		#4	D:17F/19F		
		total		440	
	Tianjin (天津)	#1	25F/29/29F	150	29"CV: 20k/m, All full loading, 29"RF: 75k/m 32"WRF:drop due to demand & tech,
		#2	D:17F		
		#3	34F(tension)	55	
		total		205	
	Total			645	
Mexico (SDIM)	Tijuana	#1	20/21/21F/25V/27V/27VF	200	21F:start from July-Aug.'02., Line modify from Jan. to Mar.'03 to produce 25V,27V,27VF more. Focus on 27VRF 27V=1R, Plan postponed
		#2	25V/27V/27VF	135	
		#3	32V		
	Total			335	
Brazil (SDIB)	Manaus	#1	20/D:17/21"RF	80	Now under loading, 21"RF to be added(=>MP starts from 2Q,'03) 14" line under loading. * 29CV/29RF ITC start from Aug. 2001
		#2	14/D:15	50	
		Total		130	
Europe	Berlin	#1	20/21=>Large CPT	190	Large CPT(28",29"RF) from 2Q, 2003. => Output will be reduced due to line conversion. 25":124k, 28":90k, 28"WF:480k, 29"RF:620k
		#2	25/29F/28WF/28	105	
				295	
	Hungary	#1	20/21/21F	180	21"RF: started from '02.May, '03.Jan.: 30k/m) 2002 plan : 20":400k, 21":900k, 21"F:200k, Large line to be run in Feb.'04/ M-P)(U\$90mil, 1.2mil capa)
		#2	28WF/(29RF)/32WRF		
		Total		475	
	SDI TOTAL			2,813	

* Y 2000 sales

. CDT : 27 Mil.

. CPT : 26.5 Mil. TTL= 53.5 Mil.

* Y2001 sales forecasting

. CDT : 22 Mil.(flat:25.5%)

. CPT : 26.5 Mil. TTL = 47.9 Mil.

(flat: 17.6%)

* Y2002 sales

. CDT : 22.5 Mil ?.(flat:45.3%) ??

. CPT : 32 Mil. TTL = 54.5 Mil.

* Y2003 budget

. CPT : 34.5 Mil. (due to more 10", add 17" for SEC, and Hungary full loading)

*Fine pitch : 29"RF 0.63mm decided and to produce from Sep. 2002.

32"WRF 0.51mm developed, 0.41mm under study

*U\$600mil profit in 2002 (EU operation:U\$50mil profit,)

TOSHIBA CRT LINE STATUS

* D : CDT Drop/New

Oct.29, 2002 updated <CAPA:KP/M>

Country	Site	Line	Products	CPT	CDT	Remarks
Japan	Himeji (姫路) (Nagoya)	#1	D:17		0	
		#2	29F/28WF	100		26 working days=>110k/m max. can be produced in 2Q(=>29"RF:70k/m above).
		#3	32WF/34RF/36WF	55		34:30k less, 36:10k
		total		155		
	Fukaya (深谷)	#1	D:17/17F/19			Closed in Feb.2002
		#2	D:17		0	Closed in Feb.2002
		total		0	0	
		Total		155	0	
USA (TDD)	Horsehead (NJ.)	#1	34"CV/RF, 38"CV/RF	80		Flat will be increased. Now=34"F:10k+34":30k+38"F:20k+38":20k/m, 34"RF:first to Toshiba TV.
		#2		0		Moved to Thai.
		Total		80		
Thailand (TDDT)	Bangkadi	#1	15F/ 15D	20	150	15"F : 20k/m only for Toshiba
		#2	21/21F/25F	160		25"F:30k/m=>Tint glass.
		#3	D:15M		0	Stop
		#4	D:17		60	01.05 start (FLAT+MNN), 15"F CPT started from May.(to increase by 50k/m)
		Total		180	210	
Indonesia (TDDJ)	Jakarta	#1	14/20/21	180		
		#2	20	160		Jan.,'02 Start, J/V with Funai. Only for Funai demand.
		Total		340		
		TOSHIBA TOTAL		755	210	

* CDT production will be dropped in 2003 ?

* Fine pitch : 32"WRF 0.41mm developed and to produce it mid of 2003.

OEC CRT LINE STATUS

* D : CDT

Drop/New

Jan. 2003 updated <CAPA:KP/M>

Country	Site	Line	Products	CPT	CDT	Remarks
Korea	Kumi	BSL	20/21			To be shut down on Dec.15,2001.
		BSA	D:14/15M			Tb be shut down on Dec.15,2001
		O-7	D:17/19		150	*Will make TV with their own CPT from Q1,'03 ?
		O-9	D:15/17"F		120	
		O-10	D:17/17F		150	
		O-8	21F/25/29	90		
	O-11	29/29F/32WF	100			
Total			190	420		
Vietnam	Hanoi	#1	14/16/20/21	190		50k/14"+50k/16"+90k/20",21", 25% to local, 25% to Korea,....
		#2	20/21/21F	0		Gumi line moved. To start from Jul.2002=> Nov.'03 to be started
	Total			190		
France	Longwy	#1	14/20	0		*1.5mil/'02. Might be closed from Jan.'03 ?
		Total			0	
Mexico	Mexicali	#1	20	180		Plan to make 21"RF in '03 due to 20" demand slowdown.
		#2	D:15			Temporary Shutdown in Jul.,'01
	Total			180	0	
OEC TOTAL				560	420	
				2	4	
				3	1	
				5	5	

On stike from Nov.9 to Dec.20 but ,,,,,,

THOMSON CRT LINE STATUS

* D : CDT

Drop/New

Jan. 2003 updated <CAPA:KP/M>

Country	Site	Line	Products	CPT	CDT	Remarks
Italy (Videocolor)	Anagni	#1	32W/32WF/34RF/38	65		29"F,28"F,32"F :all tention mask, yield problem.
		#2	24W/28W/28WF	80		
		#3	28/29RF	85		
	Total			230		
Poland (Polkolor)	Piaseczno	#1	20/21	160		*21"RF just started with Invar. To be replaced by Akoka.
		#2	21/21F	160		'97.09 start from MEICA
		#3	25/28	160		
	Total			480		
USA (RCA)	Marion (IND.)	#1	20/21	0		Nov.'01, stop. Transfer to China?
		#2	27	0		*27" to be stopped in 2003.
		#3	27	88		*Take out 2 lines by 2004 and close US plant by 2005
		#4	29/29RF	95		*40" stopped from 2003?
		#5	34RF/38	42		
	total			225		
	Scranton (PEN.)	#1	27V	0		Stopped
		#2	27V	0		Stopped
		total			0	
	Total			225		
佛山	Foshan	#1	29/29"RF/(28"WS)	110		29":100k, 29"RF:10k(SPP from Oct.'02), 21"RF planned from July.'03(?)
		#2	34"/34"RF			Hitachi-USA L&Jumbo line to be installed? 3Q,'03. Capa:70k/m
	Total			110		
Mexico	Mexicali	#1	29RF/34	75		*Jan.'02 start
		#2	29	40		*Ramp up from early 2003
	Total			115		
THOMSON TOTAL				1160		

CPT CRT LINE STATUS

* D : CDT

Drop/New

Oct.29, 2002 updated <CAPA:KP/M>

Country	Site	Line	Products	CPT	Remarks
Taiwan	Taoyuan (桃園)	#1	D:15		'00.11 drop (moved to Fuzhou China in '01)
		#2	D:15M		'00.11 drop (moved to Fuzhou China in '01)
		#3	D:17		T. Shutdown('01.7),move to Wujiang #1 in '02
		#4	D:17		T. Shutdown('01.7),move to Wujiang #2 in '02
	total				
	Yangmei (楊梅)	#1	D:17/19		Drop 19 from Sep.,'01. move to Wujiang #3 in '03
		#2	D:17		move to Wujiang #4 in '03
		#3	D:17F/19/(19F)		To be transferred to Fuzou
		#4	D:17F		To be transferred to Fuzou
	total			0	
	Total			0	
Malaysia	Shahalam	#1	14	200	
		#2	14	200	Converted to CPT
		#3	20/21/21F	160	Mar.'02 :21"F started.
		#4	14/(D:17)	170	
		#5	D:17/17F		
		#6	D:15/17		No production temporarily
		#7	15F/D:15M	80	To move to Wujiang, China #5 in '04, Jan.'02:15"F sample
		#8	D:14/15		To move to Wujiang, China #6 in '04
		#9	L&J (29"RF?)		Old Hitachi line, To be started end of 2003 after remove 1 CDT line.
	Total			810	
China	Fuzhou (福州)	#1	D:15		
		#2	D:14/15		
		#3	D:(15)/17F		'00.8 start (New Line), MNN
		#4	D:17F		'00.9 start (New Line)
		#5	D:15/17		'01.4Q start (Old Line)
		#6	D:15/17		'01.4Q start (Old Line)
	Total				
	Wujiang (吳江)	#1	D:17		'02.8 start (move from Taoyuan #3)
		#2	D:17		'02.8 start (move from Taoyuan #4)
		#3	20/D:17/19		'03 start (move from Yangmei #1)
		#4	D:17		'03 start (move from Yangmei #2)
		#5	D:15M		'04 start (move from Malaysia #7)
		#6	D:14/15		'04 start (move from Malaysia #8)
Total					
UK	Mossend	#1	14	0	00.06 start, No production temporarily
		#2	14	100	To be closed in Feb. 2003. But maintain 50k/m due to grant issue with UK(sell to Orion...) *2002 : 1.5mil produced & sold.
	Total			100	
CPT TOTAL				910	

US\$40/M'sia landed quote

MATSUSHITA CRT LINE STATUS

* D : CDT

Drop/New

Sep. 2002 updated <CAPA:KP/M>

Country	Site	Line	Products	CPT	CDT	Remarks
Japan (MEC)	Kiyohara (清原)	#1	29F/28WF/32WF			drop
		#2	D:17/19			'99.10 19" drop
	Utsunomiya (宇都官)	#1	25/W:24/28/D:(21)			drop
		#2	4-11/D:17			drop
		#3	D:10/17/19/20/21			drop
	Takatsuki (高規)	#1	D:17			drop
		#2	33/WV:32-36	25		
Total				25		
China (BMCC)	Beijing	#1	14	150		14" 2002 year end stock : 50k
		#2	21	140		21" ttl : 190k/m
		#3	21/29/29F	95		21"F ttl : 70k/m
		#4	21/25	120		29" ttl : 133k/m
		#5	29	90		29"F : 11k/m
		#6	34F	15		29"RF & 34"RF major customer : Panasonic(SanDong)
		#7	D:17			'01. start ,but stop again
			PRT tube			02.Oct. sample stage. 1mil capa('03 plan:1.08mil)
Total				610		
Malaysia (MMEC)	Selangor	#1	20/21	130		
		#2	10/15F/21F/25/29	130		
		#3	15F	80		
		#4	D:15/17			drop ('00, Q4)
Total				340		
USA (AMEC)	Troy (OH.)	#1	21	100		
		#2	29/34	100		
		#3	37	45		
Total				245		
Germany (EMEC)	Esslingen	#1	28W&WF/32WF/29F	110		
		#2		0		Temporary stop.
Total				110		
MATSUSHITA TOTAL				1330	0	

SONY CRT LINE STATUS

* D : CDT

Drop/New

Sep. 2002 updated <CAPA:KP/M>

Country	Site	Line	Products	CPT	CDT	Remarks
Japan	Inazawa (稲澤)	#1	D:19		40	00.Q2 21"added
		#2	D:19/21		40	
		#3	D:21		60	
		#5	W:32/34/36	80		
	Mizunami	#2	29/W:24/28/32/35	80		
Total				160	140	
Singapore (SDDS)	Singapore	#1	14/14F/D:15	100	0	Apr.,'01 15CDT start => Stopped
		#2	21F	150		
		#3	25/29/29F	120		
		#4	D:17F		50	
	Total			370	50	
USA	Sandiego (CA)	#1	21/21F	50		
		#2	29	120		
		#3	34F/37F	65		
		total	235			
	Pittsburgh (PEN)	#1	29F	65		
		#2	34/34F/37F	65		
		total	130			
Total			365			
UK	Bridgend	#1	21/25/29	120		
		#2	25/29/29F	120		
		#3	28WF/29F/32WF	120		
	Total			360		
China	Shanghai	#1	21F/29F	70		
		#2	29F/34F	60		
	Total			130		
SONY TOTAL				1385	190	

*CDT production : 3.9m/'01 -> 1.9m/'02

17"&19"CDT production will be drop end of 2002

21"CDT also to be stopped in 2003 ? --- Nov. 2002 ---

HITACHI CRT LINE STATUS

* D : CDT

Drop/New

Sep.30, 2002 updated <CAPA:KP/M>

Country	Site	Line	Products	CPT	CDT	Remarks
Japan	Mobara (茂原)	#1	D:17			
		#2	D:17			
		#3	D:17			
		#4	33/WV:32-36			
	Sakura (佐倉分)	#1	26~29.W:24/28/32			
		#2	D:(17)/19			
		#3	D:19			
		#4	D:21			
	Total					
	Singapore (HEDS)	Singapore	#1	D:17		
#2			D:15			
#3			D:17/19/19"F			
#4			D:17			
#5			D:17			
Total						
Malaysia	Malaysia	#6	D:17			
USA	Greenville	#1	29/34/37	0		Sold to Thomson (=>move to Thomson China factory)
Total				0		
China (SEG-HTC)	Shenzhen	#1	21	145		21"F to be added from Dec.'02 ? FS:45k+SF:20k, From Mar.'03: 80k/m after line implementation. FS=RMB1400~1450/6month 21"RF starts from Sep.'03.(=>Old Hitachi 21"CDT line, 1.5m/y capa),
		#2	21	145		
		#3	34FS and SF	65		
		#4	21"RF			
Total				355		
HITACHI TOTAL				355		

MITSUBISHI CRT LINE STATUS

* D : CDT

Drop/New

July.07, 2002 updated <CAPA:KP/M>

07/08/2002

July 07, 2002 updated - SGM /AKK/ML

Country	Site	Line	Products	CPT	CDT	Remarks
Japan	Kyoto (京 都)	#1	25/26/28/29 WV:28/24/20			drop
		#2	29/33/W:28/32			drop
		#3	33/37/42/WV:36			drop
		#5	D:17NF			Stop due to no order.
		#4	D:17/19/21NF		90	Capa: 100k/M
		#6	D:19/21NF		0	Stop due to no order.
		Total				90
Mexico	Mexicali	#1	D:17NF		120	Capa:220k/m, NMX move to NPG from Aug.'02.=>No customer ?
Total				120	NF '99.11start/'00.Q2 100%	
MITSUBISHI TOTAL					210	

NEC CRT LINE STATUS

* D : CDT

Drop/New

Country		Site	Line	Products	CPT	CDT	Remarks
Japan	Ootsu (大津)	#1	D:17				'99/E, drop
		#2	D:19				"
		#3					"
NEC TOTAL							

OTHER CRT MAKER STATUS

* D : CDT

Drop/New

Jan. 2002 updated <CAPA:KP/M>

Maker	Site	Line	Products	CPT	CDT	Remarks
Irico (4400, Rainbow)	Xianyang	#1	14	130		14" 2002 year end stock: 95k 25F:29F=50:50, Temporary 29"RF line stop from Apr.to Sep.,restart from end-Oct.? Modified to CPT line, P-P in Sep.'02, 21"RF from Nov.'02 and 15"RF from Dec.'02.
		#2	14	130		
		#3	21	150		
		#4	21	150		
		#5	25	120		
		#6	25F/29F	75		
		#7	15"F & 21"F	100		
	Total			855	0	
Novel (Mar.'02 updated)	Shanghai	#1	21/ (21F)	170		21"RF production plan cancelled. From July '02: 29"RF +34CV, 29"RF stopped,and to restart from Oct.?
		#2	25/29	135		
		#3	29/29RF	125		
		#4				
	#5	34"SF	55			
Total			485	0	485Kpcs/M = 5 line's output(=Full loading)	
Dongguan (Fudi)	Dongguan	#1	21	145		RF production from Dec.'02 (?)
		#2	25"RF/29"RF	90		
		#3	29	115		
Total			350	0		
TECO (Taiwan)	Kguanin	#1	D:17/17F		120	Sampo: 80k, AOC:20k, LG:20k, Others:30k
		#2	D:17			Shutdown Q1 '01
Total			0	120		
THAI-CRT (Thailand)	Cholburi	#1	21"	90		Jan.'03: 14"=>21" converted (mainly export to China,Changhong) Converted to CPT
		#2	14/20	90		
		#3	20/21	90		
		#4	21/21F/25	66		
		#5	14/20	120		
Total			456	0		
SAMTEL (India)	Newdelhi	#1	20/21	100		Capa to be increased from 3Q,03. 21"RF to be considered.
		#2	14	170		
		#3	21"/(15"CDT)	60		
Total			330	0		
J C T (India)	Chandigarh	#1	20	70		
		#2	20/21	70		
Total			140	0		
UPTRON (India)	Newdelhi	#1	20/21	100		Q3,'02: was slow(60k/m) due to ?
		Total		100			0
Hotline (India)	Saopaulo	#1	20/21	140	0	Hitachi-S'ore line. To be installed (Aug.'02: M-P started, Ramping up)
		#2	14/(D:15)	40		
	Total			180			0
TESLA (Czecho)	Roznov	#1	22/25/28	50		
		#2	25	50		
Total			100	0		
EKTRANAS	Panevezis	#1	20/21/24	70		2002.3Q:21"RF planned.
		#2	14/20/21/24	70		
		#3	14	100		
Total			240	0		
OTHERS TOTAL			3236	120		

EXHIBIT 27

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LG.PHILIPS Displays



Joint Business Plan

Shareholder meeting March 9th



Presentation Objectives

- **Presenters:**
P.Combes, S.P Koo, KJ Lee, H. olde Bolhaar, KS Cho, G Leborgne
- **Subject:** LG.PHILIPS Displays business plan
- **Objective:** We are here to inform and get the approval of both parents on the business plan we propose to submit to the banks.
- **Time:**
 - Presentation: 4hr. 35min
 - Q&A: during presentation

Agenda shareholder meeting March 9th

16:00	Introduction	P. Combes
	Key assumptions	
16:15	- JBP scope	G. Leborgne
16:25	- Market	G. Leborgne
16:55	- Sales	KS Cho
17:25	- Innovation	G. Leborgne
17:45	- Industrial	P. Combes
18:30	Financials	KJ Lee
19:40	Financing	H olde Bolhaar
20:00	Integration Process	P. Combes
20:20	Conclusion	P. Combes
21:00	Closure	

Vision / Mission

- Create the world leader in both the CPT and CDT display markets, and, as such, lead the CRT industry consolidation
- Take a world leadership position in the Plasma display market
- Create additional business growth and shareholder value through unbeatable value propositions to our customers
 - Strong global presence
 - Best in class time to market
 - Manufacturing excellence and cost leadership
- Offer employees a motivating, challenging and entrepreneurial work environment
- The scope is not limited to CRT & Plasma displays (exclusion of passive & active LCD displays)

CRT Strategy

- **Fast integration of Philips and LGE CRT activities to gain competitive advantages and bring out the expected synergy benefits**
- **Immediate leverage of customer base, especially parent companies to quickly exceed 30% value market share for both CDT and CPT**
- **Immediate leverage of existing product catalogues. Focus on higher value products**
- **Invest 2% in R&D, while eliminating overlapping programs to**
 - **Accelerate introduction of new CRT generations (HD, Slim, FIT), close the innovation gap with major competitors and reach our leadership goal**
 - **Develop new activities showing market pull synergies with CRT**
- **Immediate leverage of our buying power towards suppliers. Key area is Glass**
- **Optimization of global industrial resources to lower costs**
 - **Bring all sites to benchmark industrial performance**
 - **Accelerate relocation to low cost areas**

Agenda shareholder meeting March 9th

16:00	Introduction	P. Combes
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Scope of the business plan - 1

Included in the Financials

- all CRT activities
- components: DU, Gun (including sub components)

Not Included in the Financials

- Glass
- PDP
- FBT
- Yokes

Scope of the business plan - 2

- Present JBP has been made top down, taking the exchanged info memos as a starting point
- Not all synergies have been fully investigated and evaluated
 - No choice between similar existing products has been made
 - No choice of technology platforms has been made. As a consequence, the acceleration plan for new product generations as well as the line conversion plan are not available
 - Industrial plan is still based on a regional approach. Global optimization still to be worked out when above points are completed
 - No detailed, bottom up, work on industrial performance has been carried out to support the top down assumptions
- On the other hand
 - Aggressive sales targets have been set to come as close as possible to the Info memo data
 - Aggressive BOM reduction targets have been set, based on strong component standardization, which still need to be confirmed by the work to be done in the technical areas

Agenda shareholder meeting March 9th

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CDT Global Market forecast

CDT global market - 1

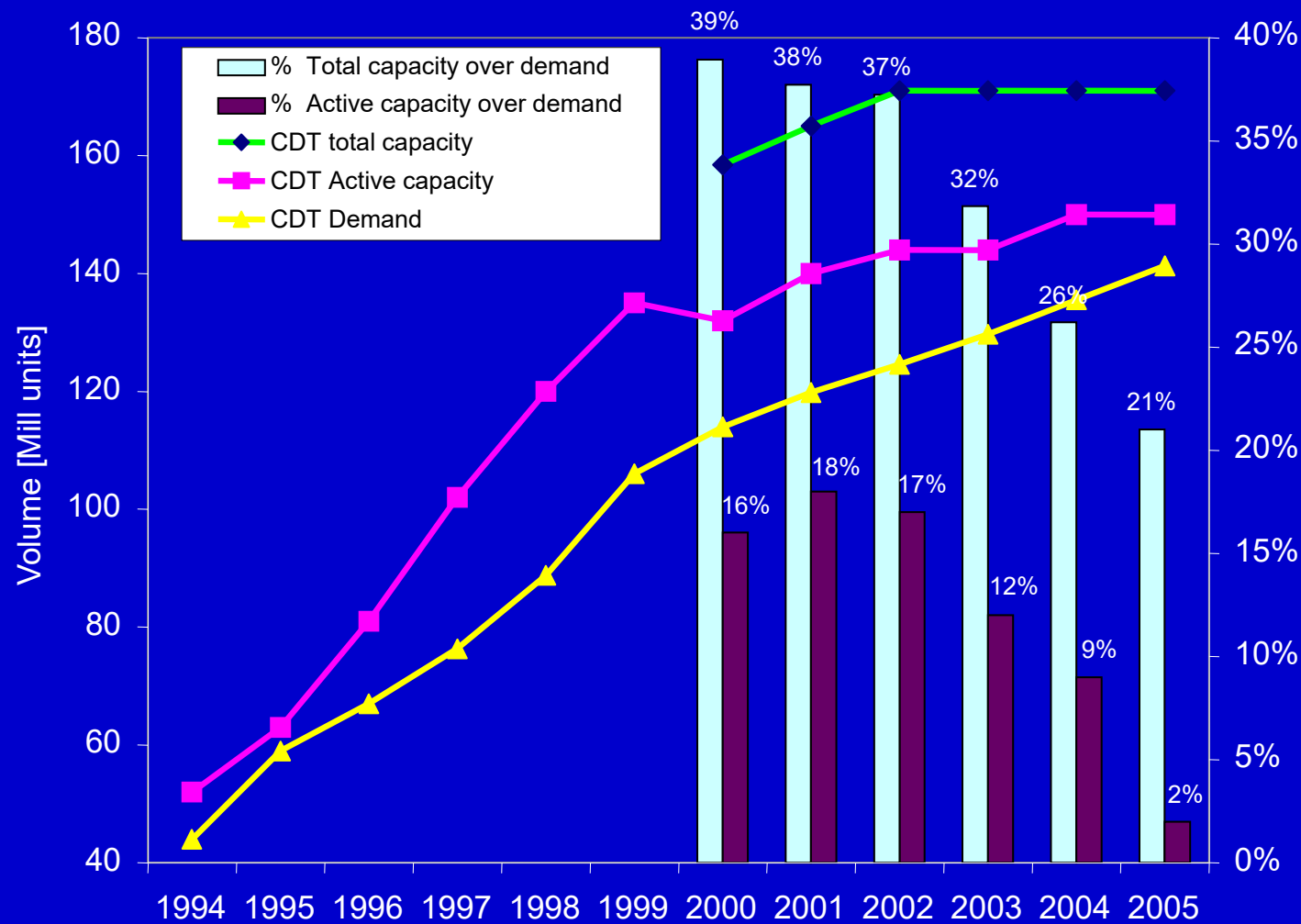
Demand will peak at 145 Mps around 2006

- Yearly growth of desktop PC market will remain below 10 % for the coming years because of fast penetration of Notebook PC's
- Accelerated penetration of LCD Monitors because of lower LCD panel price

Supply

- The 2001 total CDT capacity stands at about 165 million (without deduction from the line shifting and stoppage).
- The active capacity is 140 million for year 2001. No more investments are expected since oversupply is expected to continue
- Some capacity will be removed from Japanese manufacturers & small player as their competitive position weaken.
- Type changes towards RF and larger sizes will also reduce actual capacity.
- These last elements can be somewhat compensated by production efficiency improvements

CDT Global Supply / Demand



CDT global market - 2

Customers

- Top 10 players are increasing substantially Market Share in volume.
- Industrial Consolidation will accelerate and Vertically integrated players will get benefit.

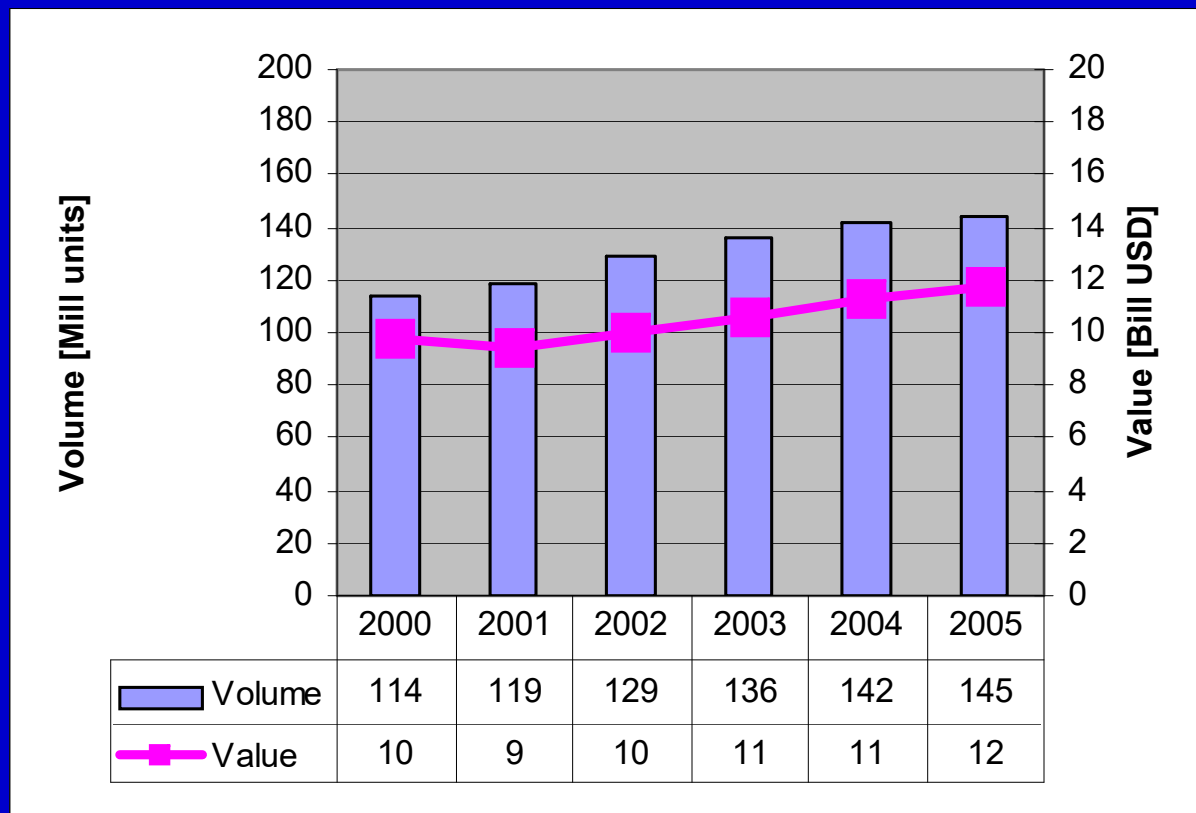
Competitors

- Further consolidation expected (will be covered in the sales plan section)

Prices

- 01~02 : - The price erosion is still strong during 2001 & 2002
due to serious oversupply in Market.
- Unreasonable price happens through industrial consolidation.
- 03~05 : - After 2002, the price erosion will slow down as oversupply
is less critical.
- Industrial behavior is expected to get more rational.

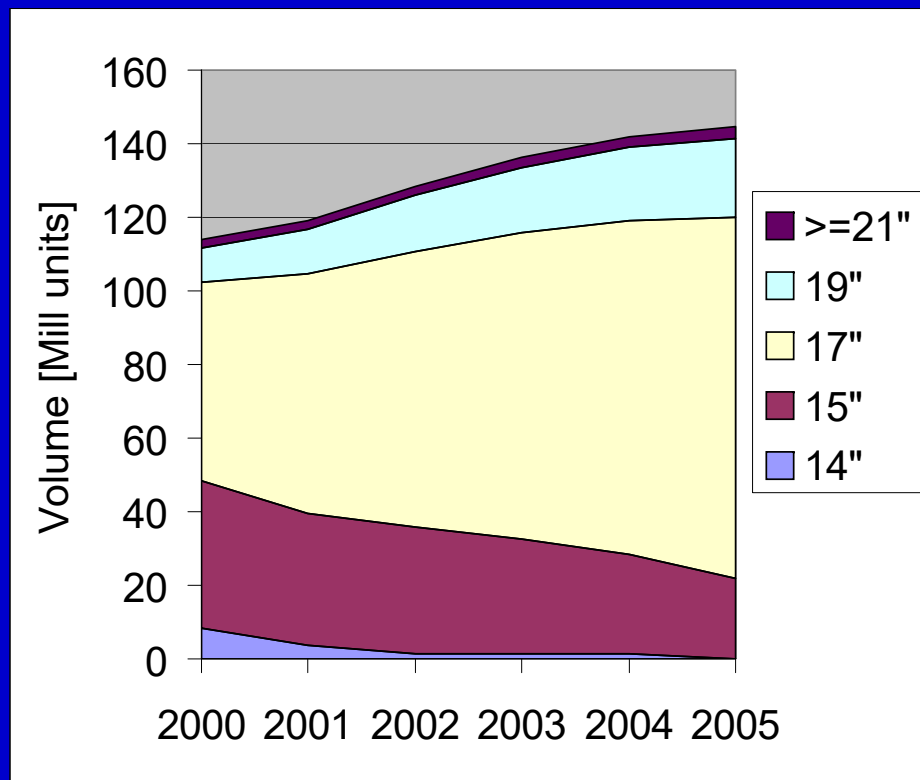
Global CDT market will grow with an average 4% in value



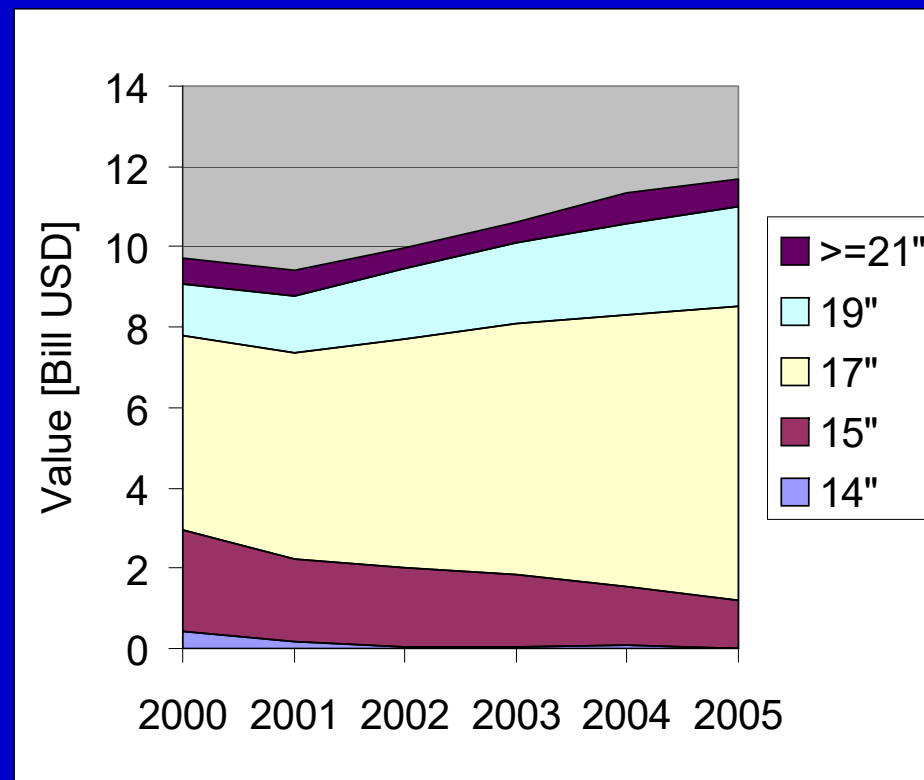
	2001	2002	2003	2004	2005	CARG 00-05
Volume	4%	8%	6%	4%	2%	5%
Value	-3%	6%	7%	6%	3%	4%

The majority will be 17".

Market in volume per segment



Market in value per segment



CPT Global Market forecast

CPT global market

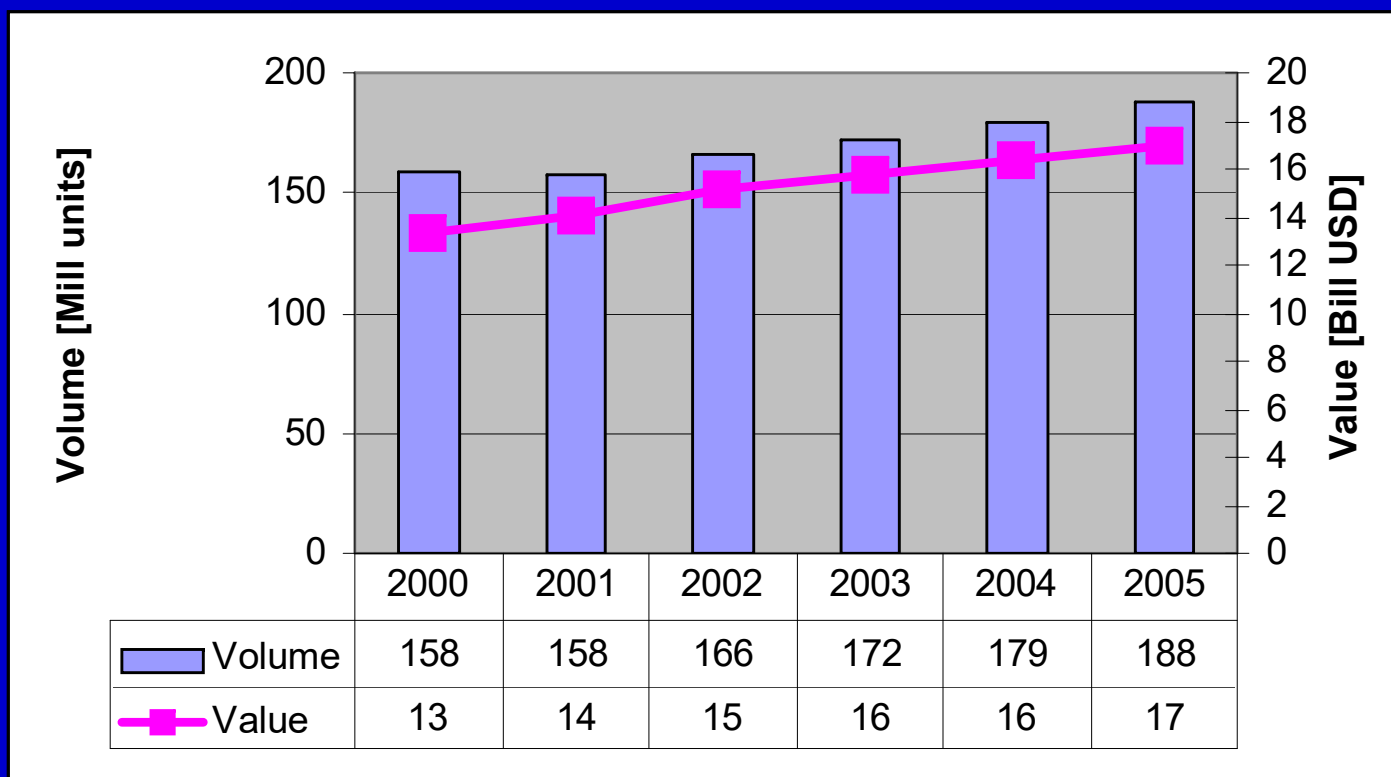
No volume growth in 2001

- Deteriorating GDP forecasts and consumer confidence in the US will cause a new delayed CTV replacement cycle. As a result, set production levels in Nafta will diminish.
- ASEAN and S-Korea set production will also diminish because of lower export and reduced local demand
- China might have to rely more on domestic sales than on exports this year. However, government has set clear export targets possibly causing further Chinese CTV price cuts .
- Europe is expected to be less affected by the US slowdown than the other regions

From 2002 onwards,

- Volume growth goes back to 4% to 5% level
- Limited penetration from alternate technologies, PDP and Projection, during the JBP time frame, confirmed by latest consumer study (Hannibal) in US, China and Europe .
- Price erosion fully compensated by product mix change to Flat and Large / Jumbo

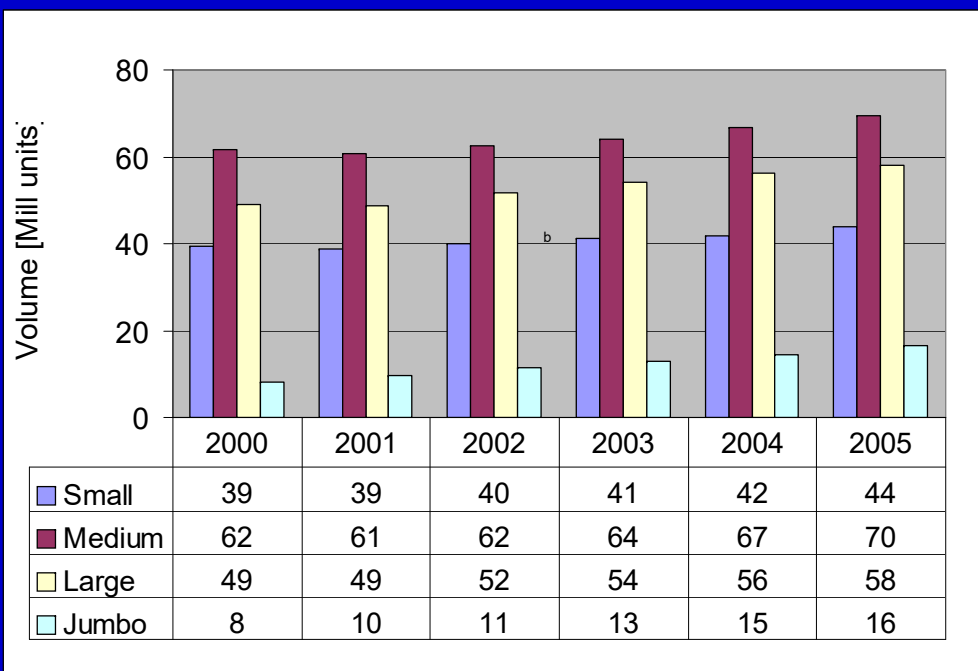
Global CPT market will grow with an average 5% in value



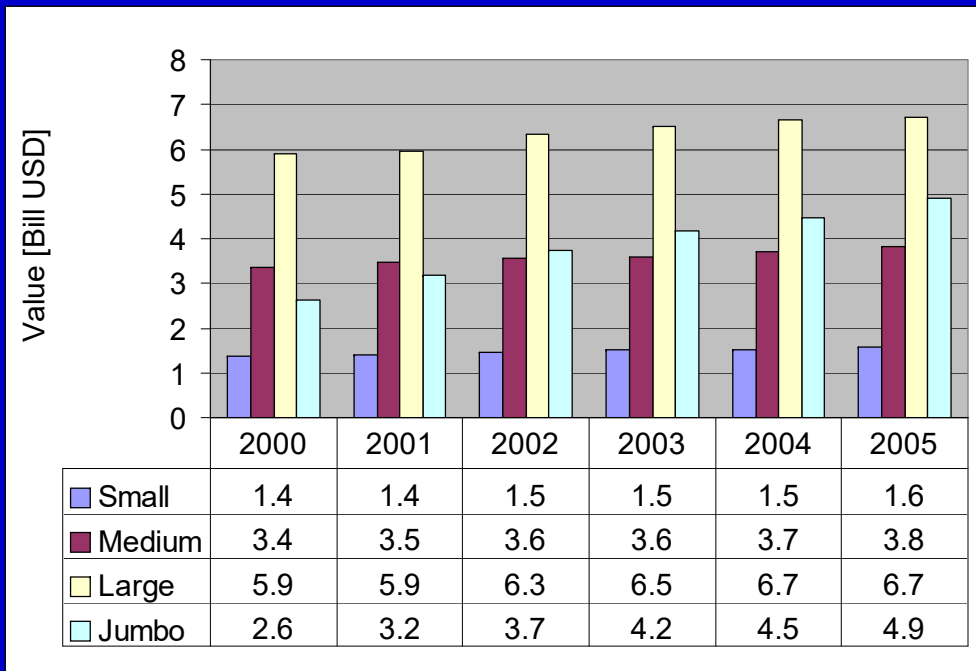
	2001	2002	2003	2004	2005	CARG 00-05
Volume	0%	5%	4%	4%	5%	3%
Value	6%	8%	4%	4%	4%	5%

Jumbo is the fastest growing segment.

Market in volume per segment



Market in value per segment

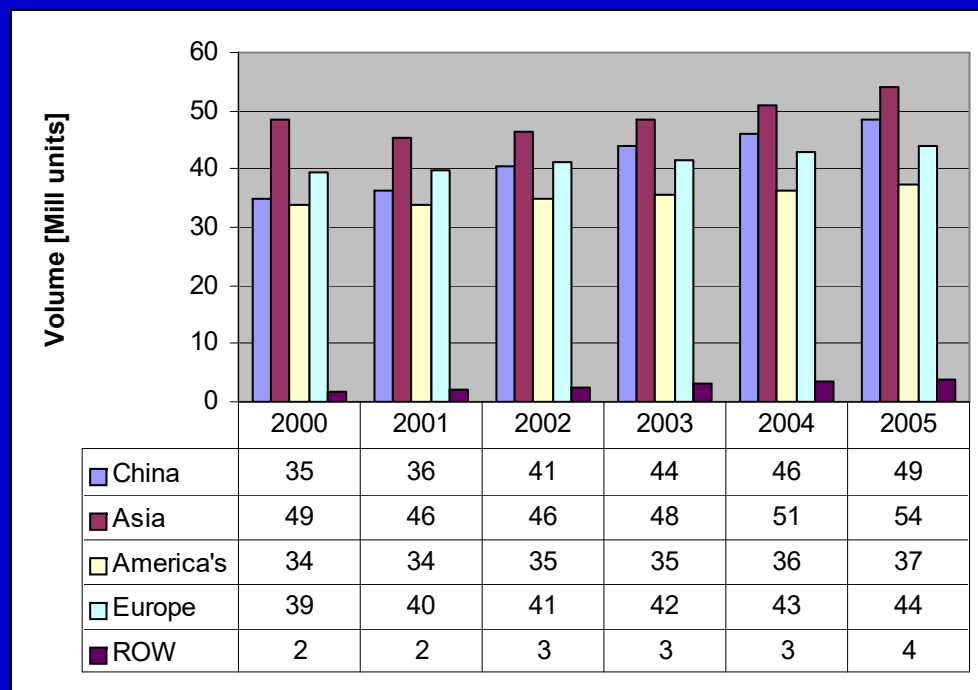


	2001	2002	2003	2004	2005	CARG 00-05
Small	-2%	3%	3%	2%	5%	2%
Medium	-2%	3%	3%	4%	4%	2%
Large	-1%	6%	4%	4%	3%	3%
Jumbo	17%	18%	15%	11%	13%	15%

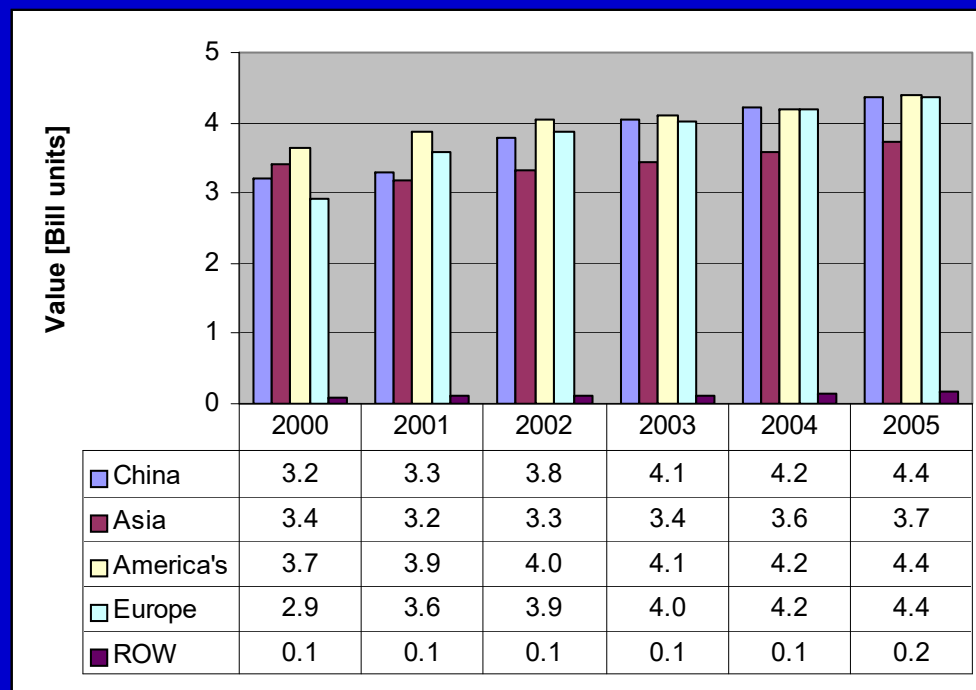
	2001	2002	2003	2004	2005	CARG 00-05
Small	2%	4%	3%	2%	3%	3%
Medium	3%	3%	1%	3%	3%	3%
Large	1%	7%	2%	3%	1%	3%
Jumbo	21%	18%	11%	7%	10%	13%

The fastest growing regions are China and Europe.

Market volume per region



Market value per region



Average value growth

	CARG 00-05
China	6%
Asia	2%
America's	4%
Europe	8%
ROW	15%

Agenda shareholder meeting March 9th

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21:00	Closure	

Global Sales Plan

LG Philips Displays will take leverage and increase market share from following synergies.

- **Product Leadership**

- LG is strong in CDT, Philips is strong in CPT while LG is strong in flat category, Philips is strong in Jumbo & Wide category.
- Full range of Product Line up - One stop buying center

- **Market Coverage**

- LG is strong in A/P & China , Philips is strong in Europe, America and China in terms of production site and sales network.
- Synergy in Logistics, Better service to customer & Time to market

- **Customer Portfolio**

- LG & Philips customer complement each other & is not much duplicated.
- Global Coverage is realized.

- **Internal Customer**

- LG CDT to Philips Monitor & Philips CPT to LG CTV

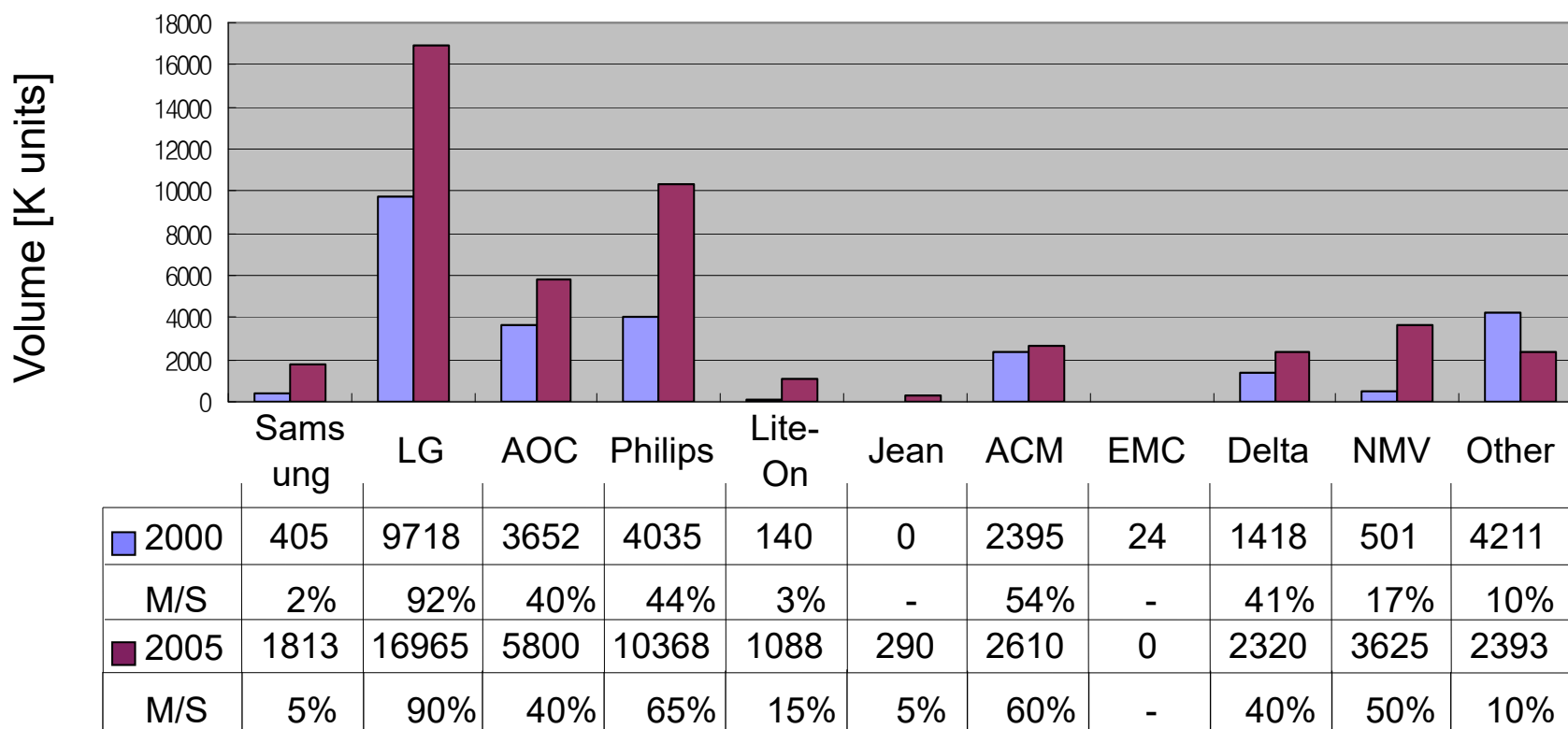
CDT Global Sales Plan

CDT customer portfolio has been strengthened with the merger

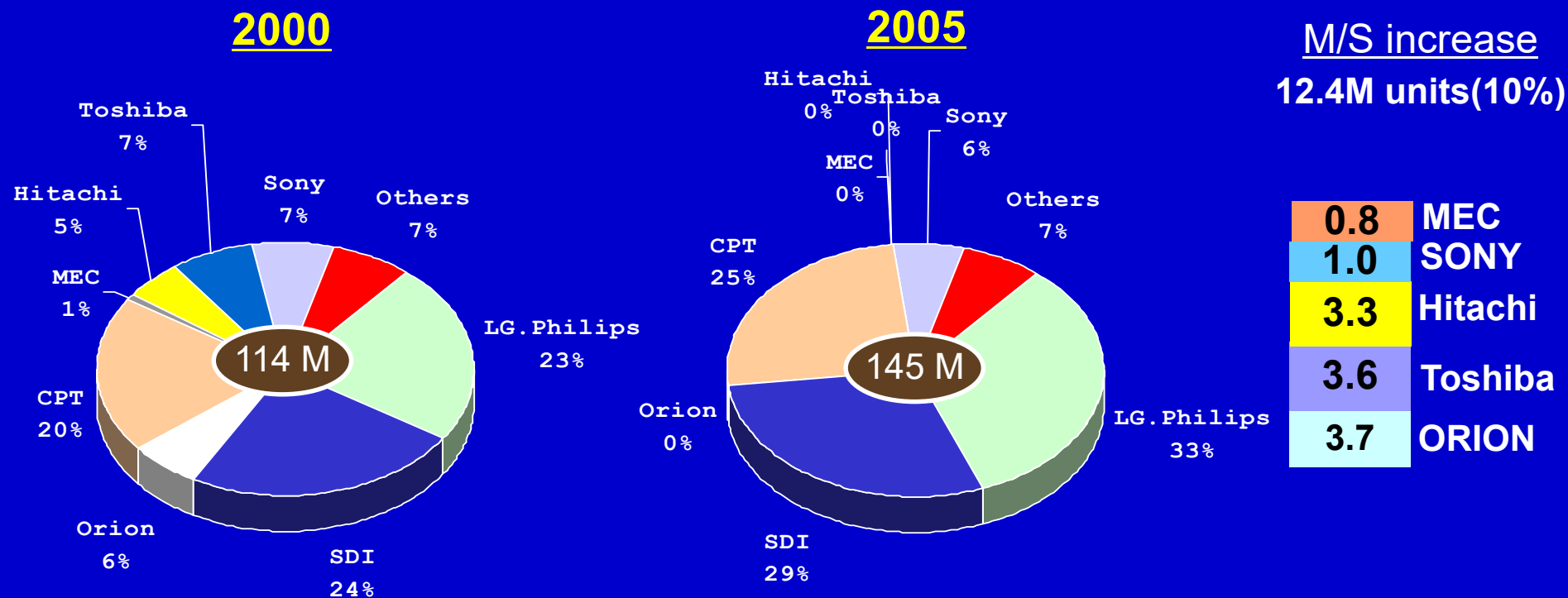
Philips LGE LG.PHILIPS Displays	Philips	Acer	AOC, Royal, Lite-on	SEC, Vestel
	LGE	AOC, Delta, Likom	ADI, NPG, Royal	Compal, Vestel, Sampo, Lite-on, NMV, SEC
	Philips LGE	AOC, Acer Delta, NMV Compal	Lite-on, Hyundai Hansol, SEC CTX, Xococo	EMC, JEAN Sampo, Great Wall, Vestel
	Partner	Strategic	Key	Potential

Customer Classification

CDT Growth comes from existing customers LG and Philips, as well as AOC and NMV



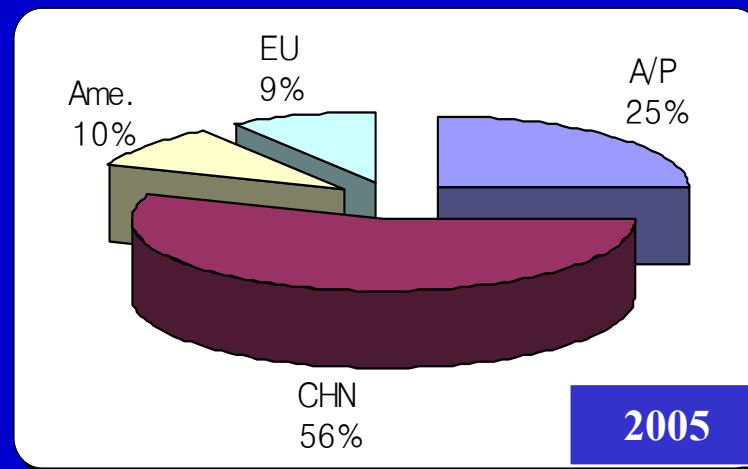
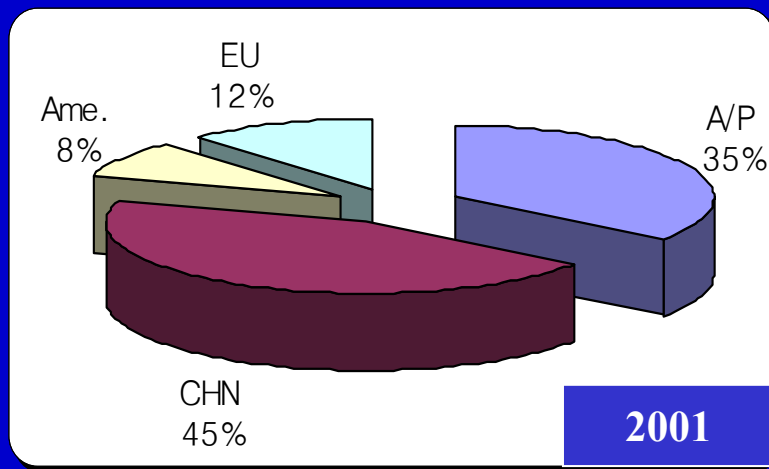
LG Philips Displays will take share mainly from Japanese & Non-vertically integrated competitors.



- Major suppliers of vertical integration (LG.Philips, SDI, CPT, Sony)
- '00 : 74% → '05 : 93%
- Major customers (Samsung, LGE , Philips, AOC, Lite-On, Jean)
- '00 : 55% → '05 : 68%
- Small players without technology & vertical integration lose their competitiveness.

China Region will take dominant position in both value & volume in 2005.

* Value composition ratio



* Volume

(K pcs)

Resional Sales	'2000	'2001	'2002	'2003	'2004	'2005
Asia Pacific	11,000	10,400	11,322	11,307	11,122	10,873
	41.5%	34.0%	30.0%	26.0%	24.0%	23.0%
China	9,728	13,982	18,681	23,266	25,952	26,946
	36.7%	45.8%	49.5%	53.5%	56.0%	57.0%
America	2,568	2,646	3,397	4,131	4,634	4,964
	9.7%	8.7%	9.0%	9.5%	10.0%	10.5%
Europe	3,203	3,517	4,340	4,784	4,634	4,491
	12.1%	11.5%	11.5%	11.0%	10.0%	9.5%
Total	26,499	30,546	37,740	43,488	46,343	47,273

The flat penetration of LG.Philips Displays sales increases to 65%, compared to 59% of the total market.

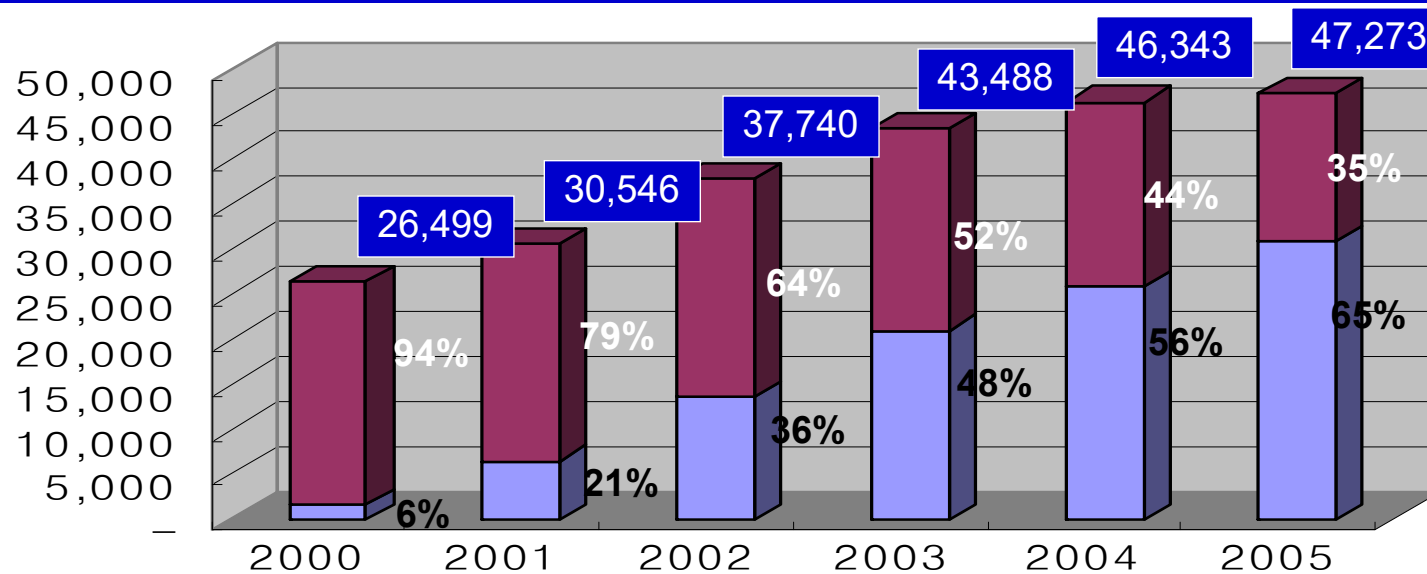
Sales of LG.PHILIPS

CAGR '00~'05

Total : 12%

Con : -8%

Flat : 82%



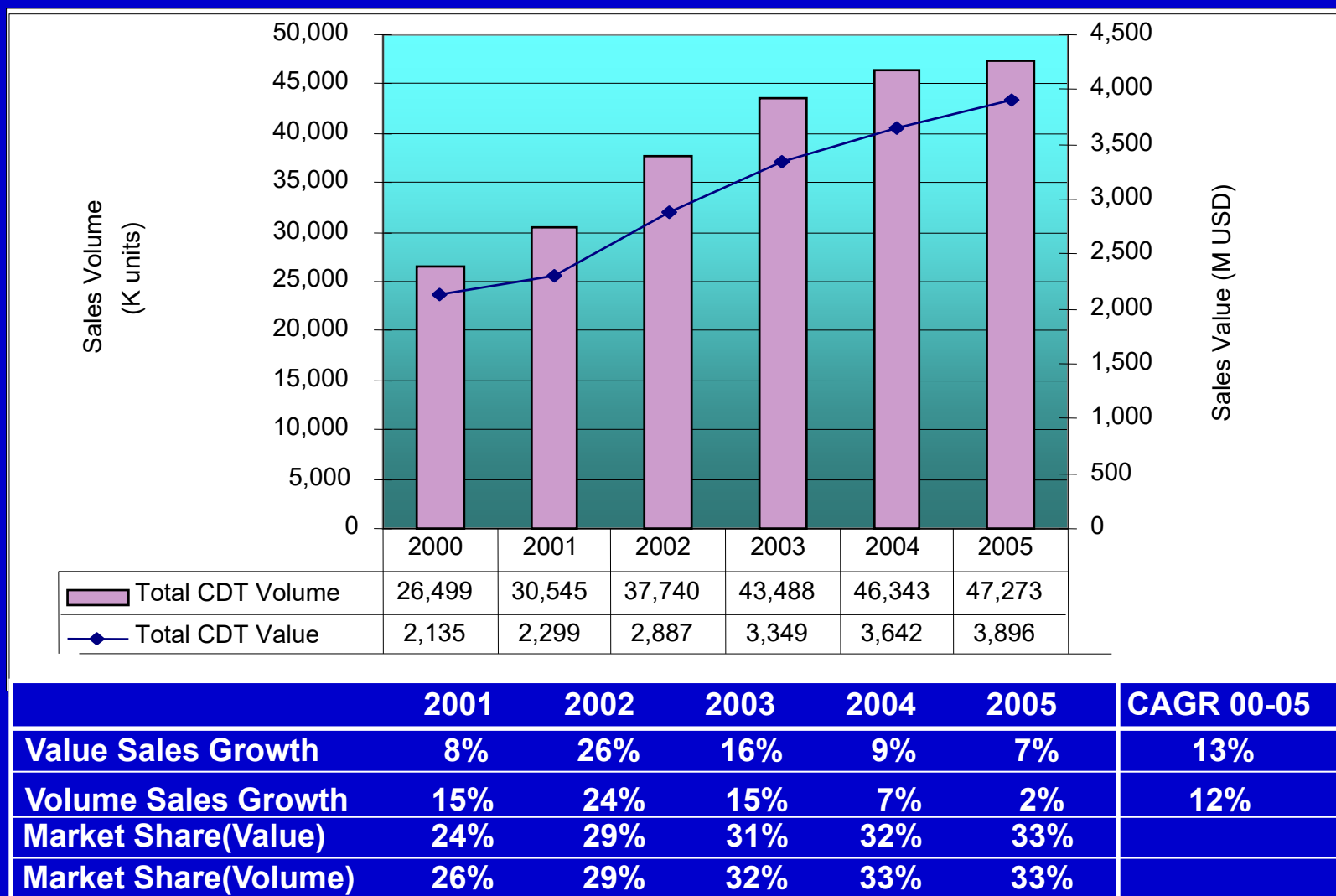
Market Demand	'2000	'2001	'2002	'2003	'2004	'2005
Conventional	95,881	86,889	82,330	76,507	68,531	58,654
	84%	73%	64%	56%	48%	41%
Flat	18,119	32,111	46,190	59,724	73,150	85,860
	16%	27%	36%	44%	52%	59%
Total	114,000	119,000	128,520	136,231	141,681	144,514

Con : -9%

Flat : 37%

Total : 5 %

Total CDT sales will reach 47M units and 3.9B USD in 2005.



CPT Global Sales Plan

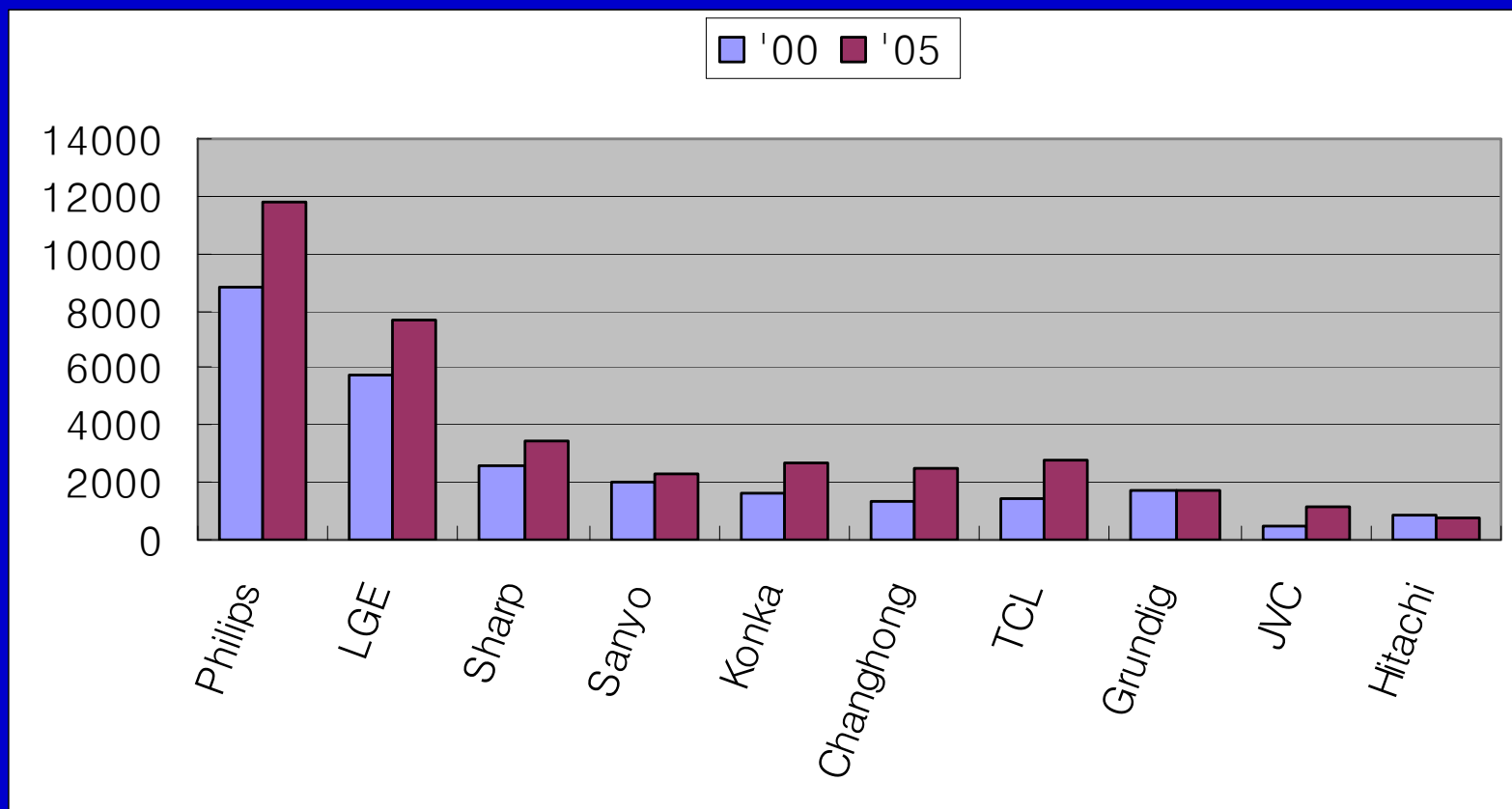
CPT customer portfolio has been strengthened with the merger

Philips	Philips	JVC, Sharp, Sanyo	Konka, TCL, Toshiba, Grundig	LGE, Changhong
LGE	LGE	Sanyo, Hitachi, Mitsubishi, Konka	JVC, Sharp, Changhong, TCL, Skyworth, Thomson Greatwall	Philips
LG.PHILIPS Displays	Philips LGE	JVC, Sanyo Konka, Sharp TCL	Changhong, Hitachi Funai, Grundig, Vestel, India, CIS	Skyworth, Haier, Hisense, Thomson, G/Wall Philco, Mitsubishi
	Partner	Strategic	Key	Potential

Customer Classification

Sales volume for top 10 customers in 2000 & 2005

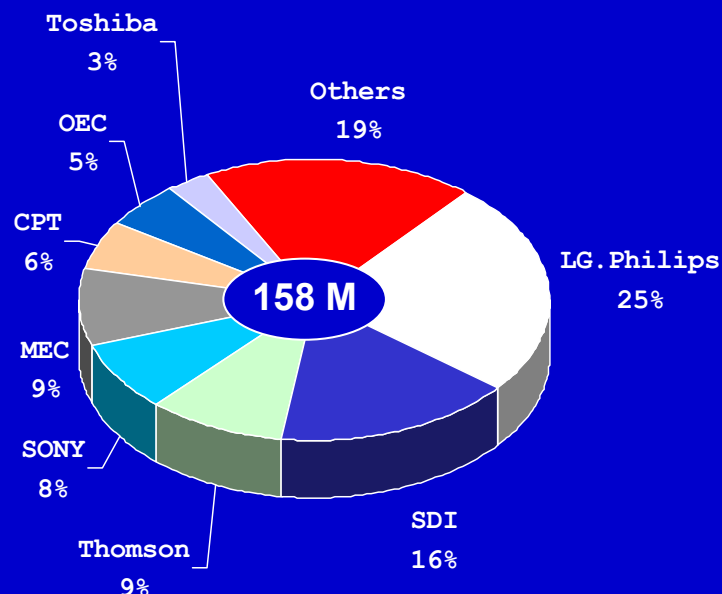
(K Units)



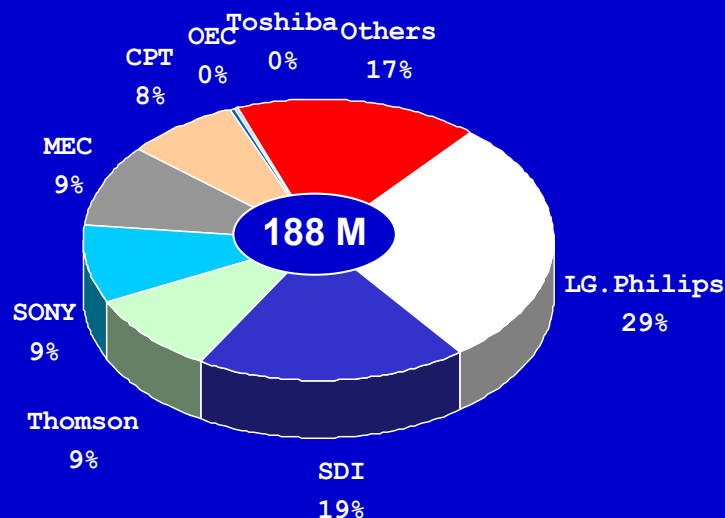
'00	70%	60%	39%	40%	30%	26%	30%	70%	15%	42%
'05	77%	70%	41%	40%	32%	32%	32%	70%	28%	44%

LG.Philips Displays will take share mainly from Orion, Toshiba, SDI and Others.

2000



2005



M/S Increase

8 Mil (4.4%)

1.4	SDI
1.6	Toshiba
2.5	Orion
2.5	Others

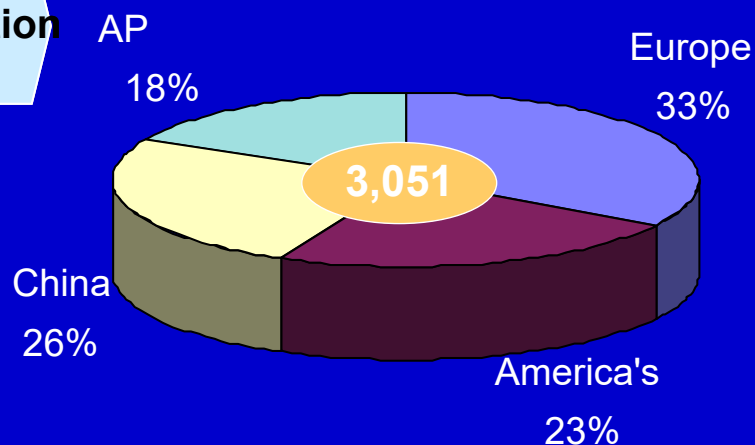
- Big players and vertically integrated makers continue to grow, while minor players lose their share or disappear.
- Entrance of new comers is hardly expected.

Regional sales for CPT are balanced across all regions with strong value growth

Value
Composition
ratio

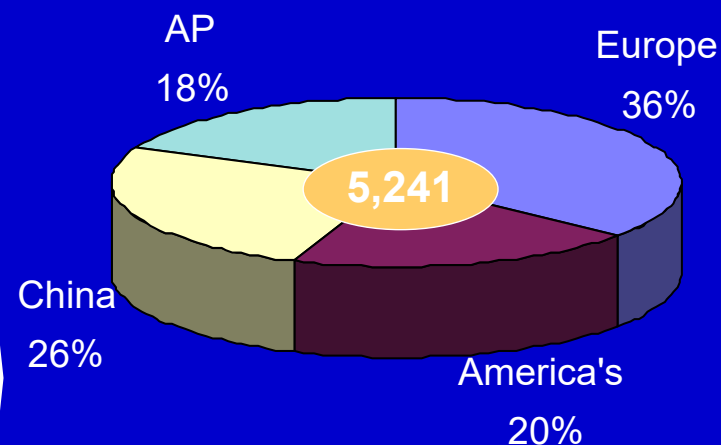
2000

(M USD)



2005

(M USD)



00-05 CAGR

AP	12.5%
China	11.5%
Americas	8.1%
Europe	12.9%

Volume

(K Units)

AP	8,257
China	8,351
America	9,049
Europe	13,187
Total	38,844

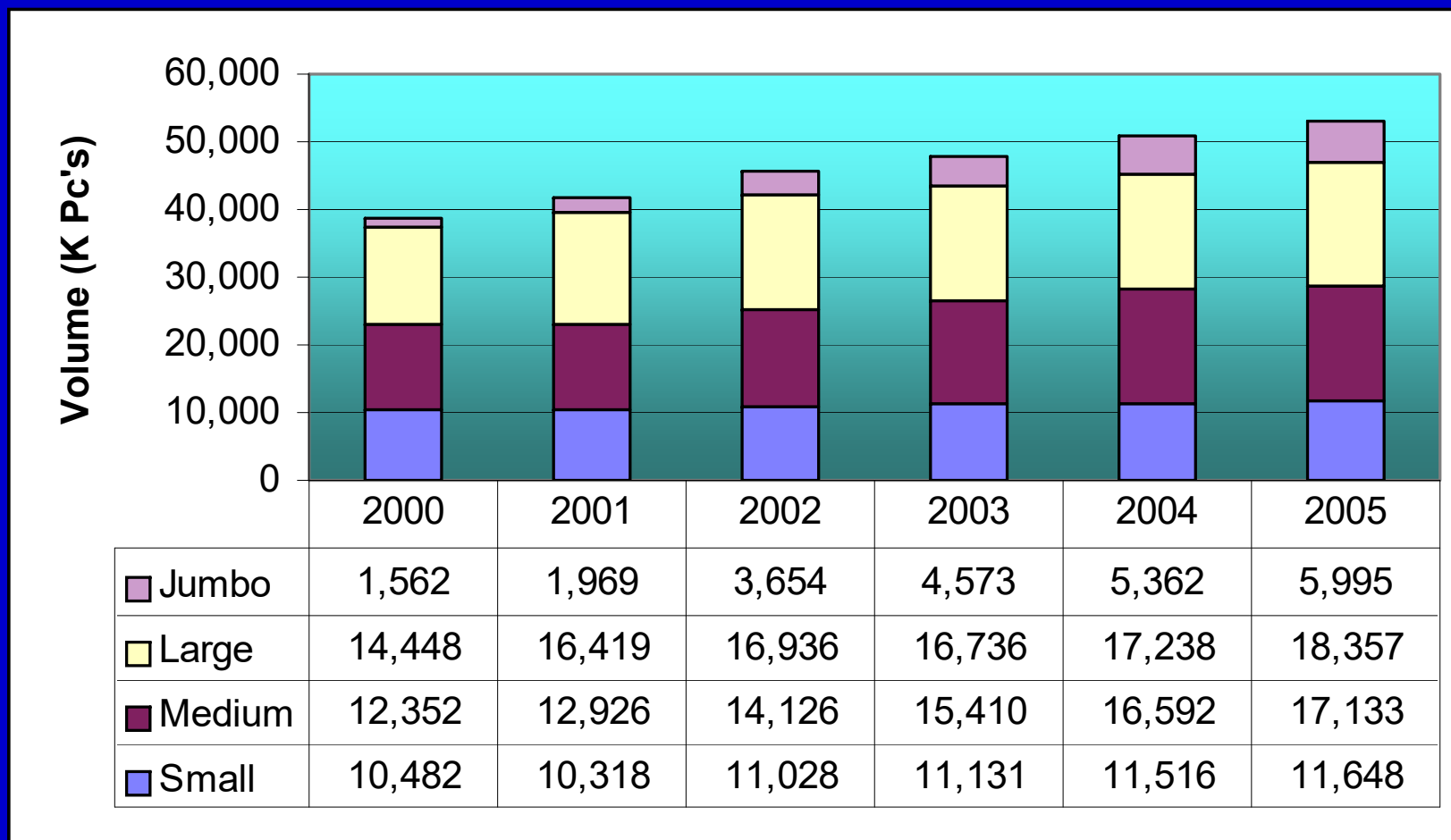
(K Units)

AP	12,682
China	12,885
America	10,605
Europe	16,961
Total	53,133

00-05 CAGR

AP	9.0%
China	9.1%
Americas	3.2%
Europe	5.2%

Main growth is made in the Jumbo segment with CAGR 31% and Real Flat with CAGR 52%



CAGR('00~'05)

30.9%

4.9%

6.8%

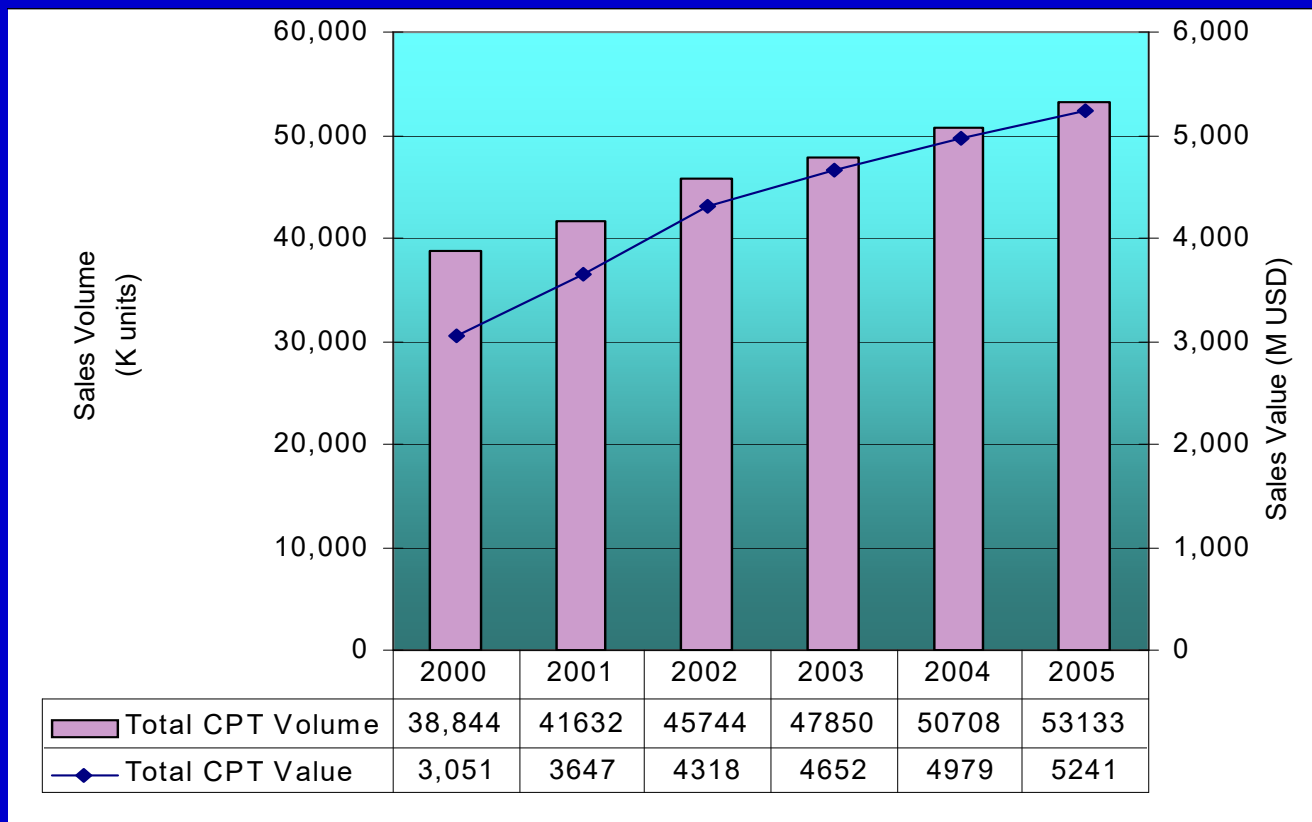
2.1%

52%

R/F
Portion

8%16%26%33%40%45%

Total CPT sales will reach 53.3 M units and 5.2 B USD in 2005.



	2001	2002	2003	2004	2005	CAGR 00-05
Value sales growth	20%	18%	8%	7%	5%	11.4%
Volume sales growth	7%	10%	5%	6%	5%	6.5%
M / S (Value)	26%	29%	30%	30%	31%	
M/ S (Volume)	26%	28%	28%	28%	29%	

Agenda shareholder meeting March 9th

16:00	Introduction	P. Combes
	Key assumptions	
16:15	- Scope	G. Leborgne
16:25	- Market	G. Leborgne
16:55	- Sales	KS Cho
17:25	- Innovation	G. Leborgne
17:45	- Industrial	P. Combes
18:30	Financials	KJ Lee
19:40	Financing	H olde Bolhaar
20:00	Integration Process	P. Combes
20:20	Conclusion	P. Combes
21:00	Closure	

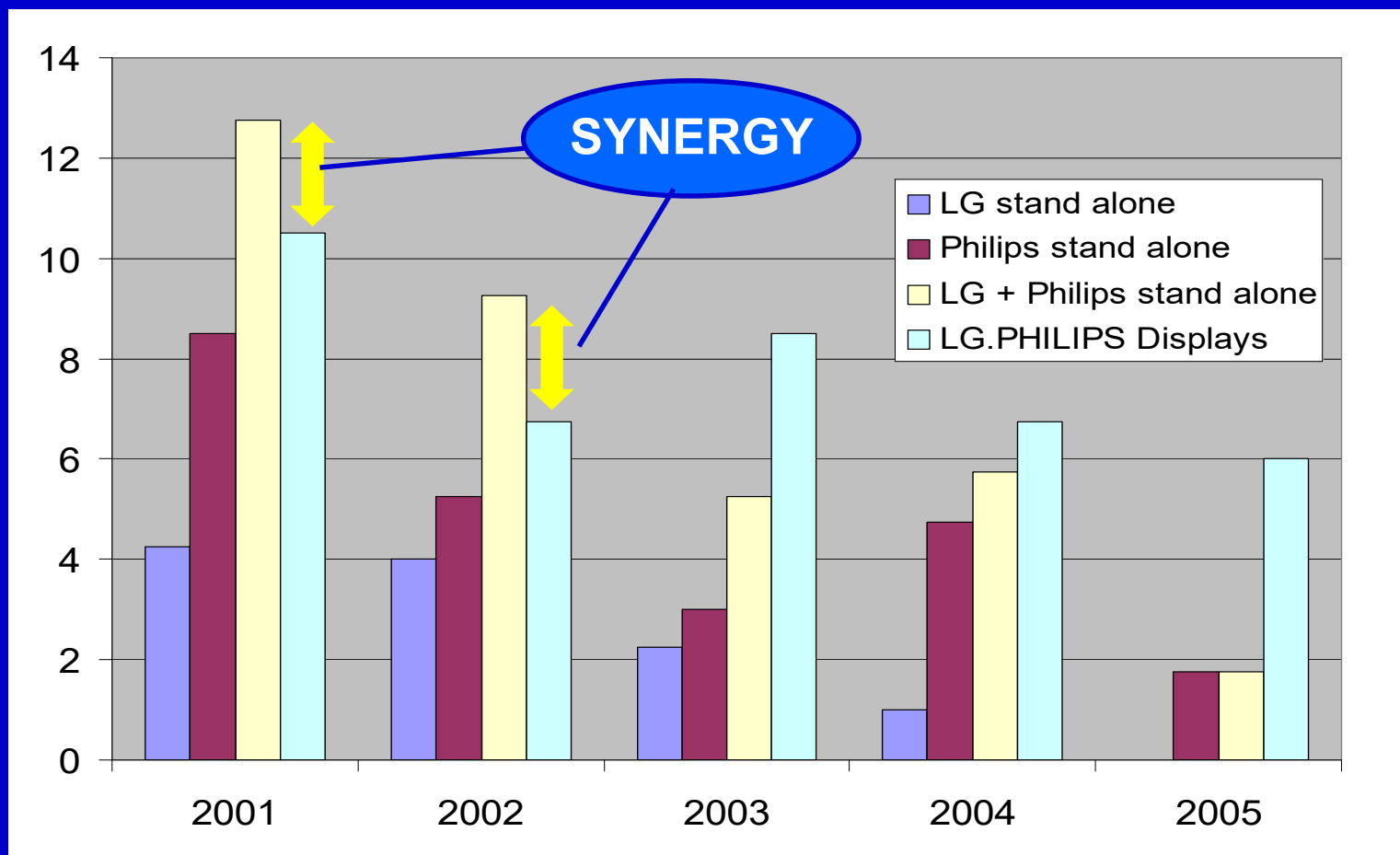
Innovation

Innovation synergies

- **Overlapping programs represent 20% of present R&D resources**
- **Potential to use excess capacity for faster introduction of new products and thereby implementing the CRT leadership strategy**
- **Strong positions in CPT and CDT allow roll-out of new technologies (e.g. HEC, FIT) over full product range**
- **Greater capacity for new product industrialisation due to combined fabs**
- **Elimination of licence fee payments due to strong combined patent position of parents**

Synergy in product roadmap.

Number of
products in
development



CRT Innovation strategy

- Support strong sales growth with full product lines and quickly closing the innovation leadership gap.
- Consolidate existing product roadmaps and accelerate time to market of new product generations by resource re-allocation
- in CPT :
 - Select optimum technology platforms
 - major drive to HD and slim, followed by super-slim
 - FIT as real breakthrough to digitally controlled CRT picture with cost-down and performance improvement
 - Develop vision on forward integration (display modules) for digital TV applications
- in CDT :
 - Consolidate Flat product offering
 - Drive cost down
 - slim as user benefit
 - HEC as system cost reduction

CDT- Product Range Introduction Sequence

Flat Super High-End (22", 24"WS)

Flat (SMF) (17",19")

Flat High-End (FT) (15"-19")

Conventional(14"-19")

1999

2000

2001

2002

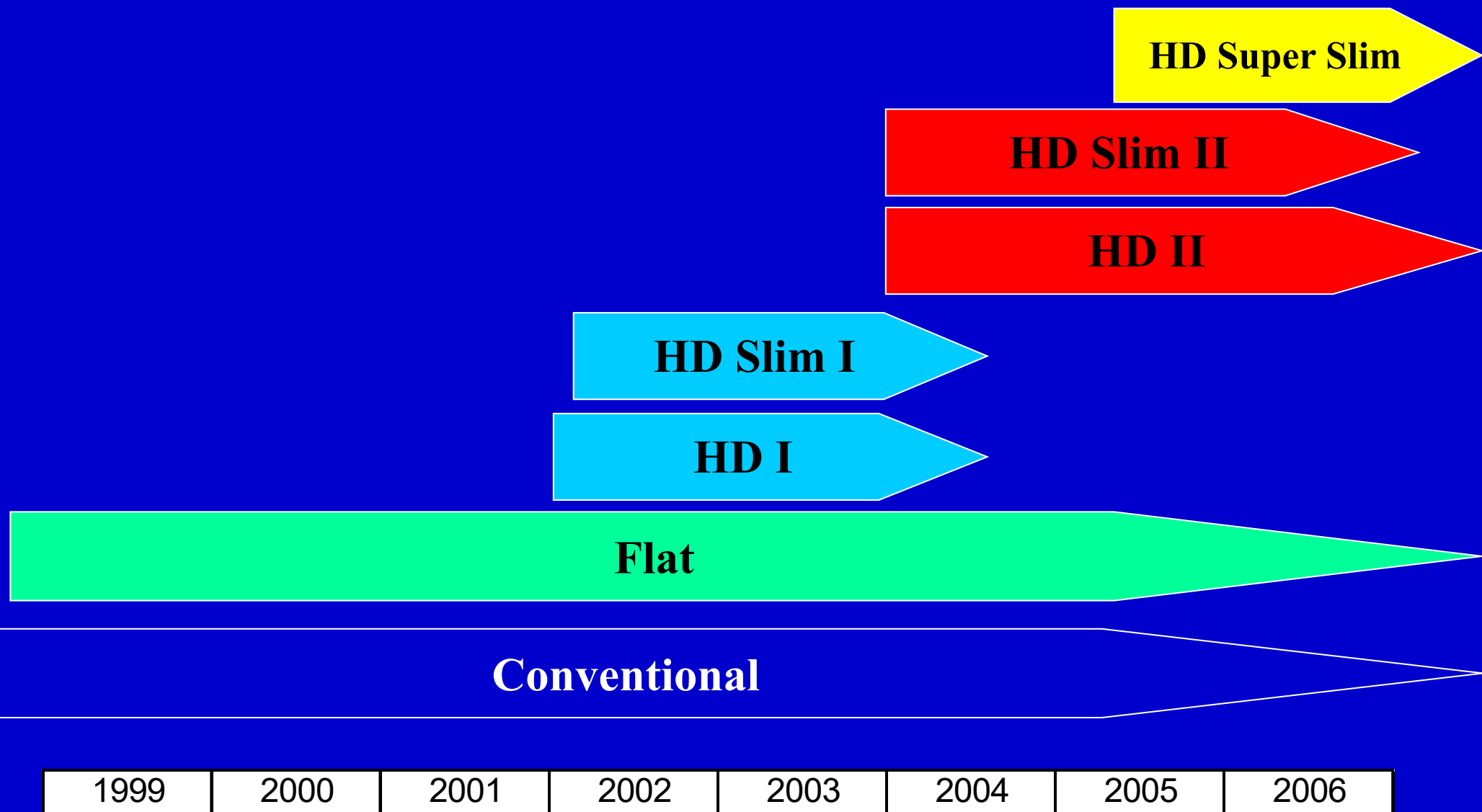
2003

2004

2005

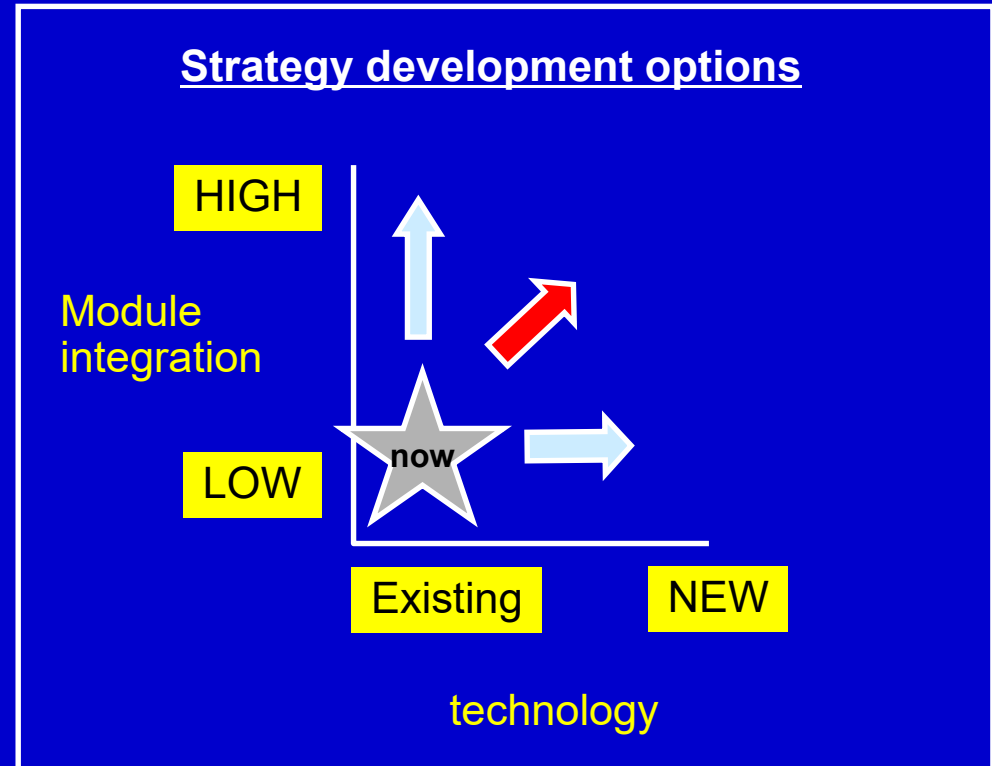
2006

CPT- Product Range Introduction Sequence

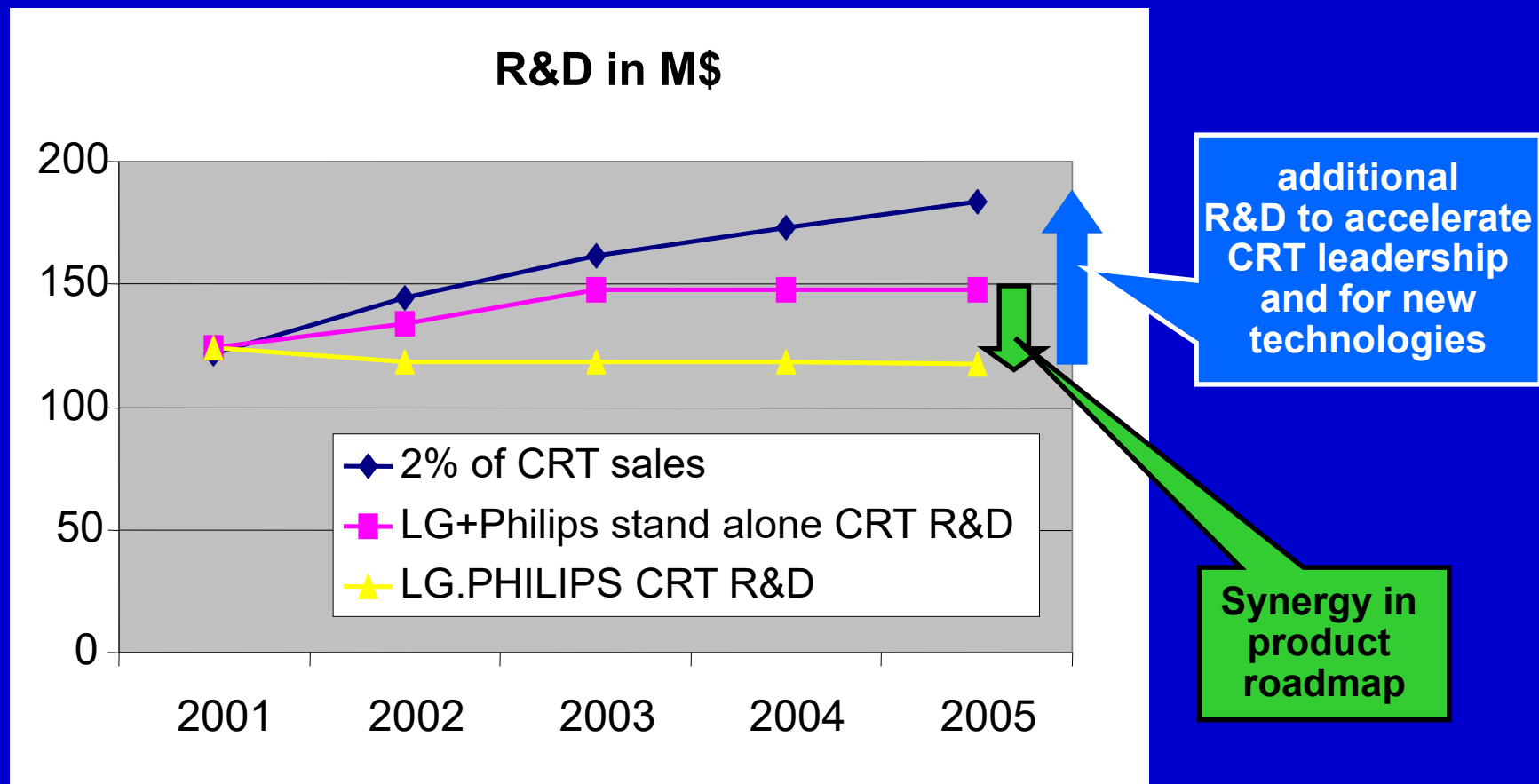


Innovation strategy for the longer term

- **Add new technologies**
 - ultra shallow CRT (10-20 cm)
 - LCOS
 - others
 - FED?
 - EL ?
- **Module Integration**
 - Add value through electronics
 - Define standard module interface



R&D Investments set at 2% of sales



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Industrial Performance Synergies

Industrial Synergies

- Secure global production bases
 - Fulfill market trends and customer needs
 - Maximize production capacity utilization through enlarged scale of sales

- Build optimal production lines by combining strengths
 - LGE : Superior productivity and product quality
 - Philips : Production system capable of product diversification

- Profit Maximization
 - Establish World Top Productivity & Cost competitiveness
 - Achieve the best industrial excellence

- Minimizing cost of capital
 - Increase investment efficiency

Combining both parties' strengths, focusing on productivity improvement.

strengths

Philips

1. Excellent equipment technology
 - Integrated magnetizing and matching for ITC
 - Flareless system for gun sealing
2. Parts designed for manufacturing process
 - DY : Gun pitch modulation(GPM)
 - Gun : Magnetizing system
3. Accumulated manufacturing data base

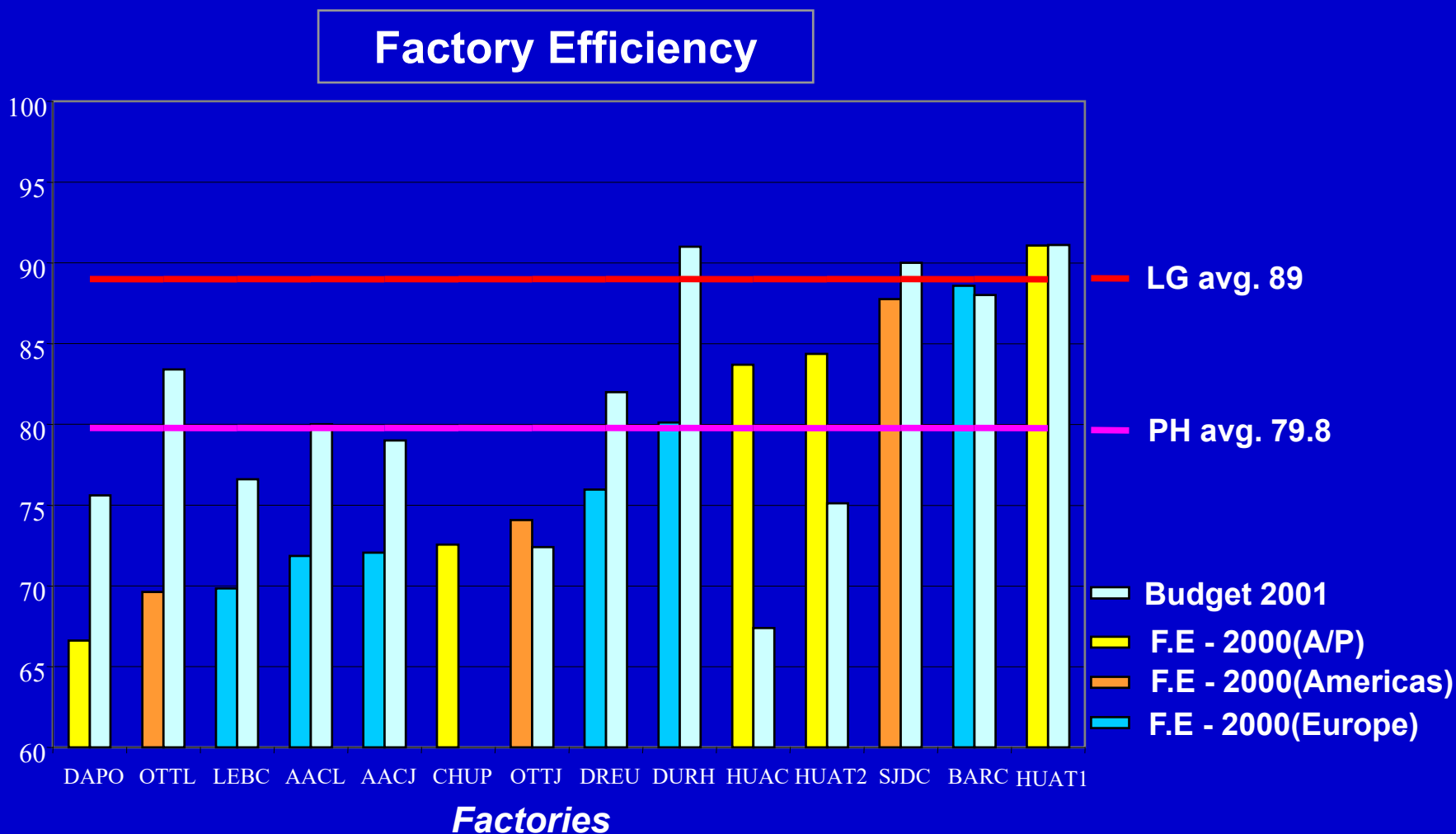
LG

1. Improvement activities
 - Super A / 6 σ
 - Task activities(bottom up)
2. Manufacturing process and technology
 - In-line process and line balancing
 - Production technology
3. Excellent equipment technology
 - Sputtering and spin coating for screen

Where to focus !

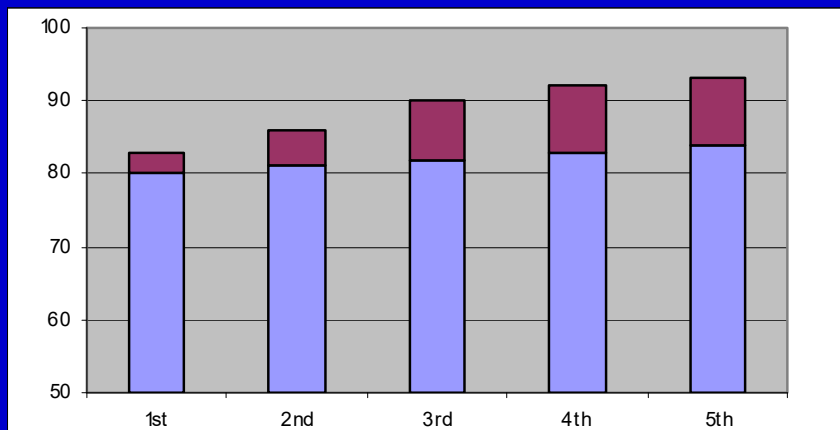
1. Productivity improvement
 - **Factory efficiency**
(process yield, utilization)
 - Reducing tact time
2. Reducing manufacturing costs
 - Material loss
 - Labor cost
(automation, industrial engineering)

Achieving the best factory efficiency through the utilization of both parties' strengths on industrial excellence.

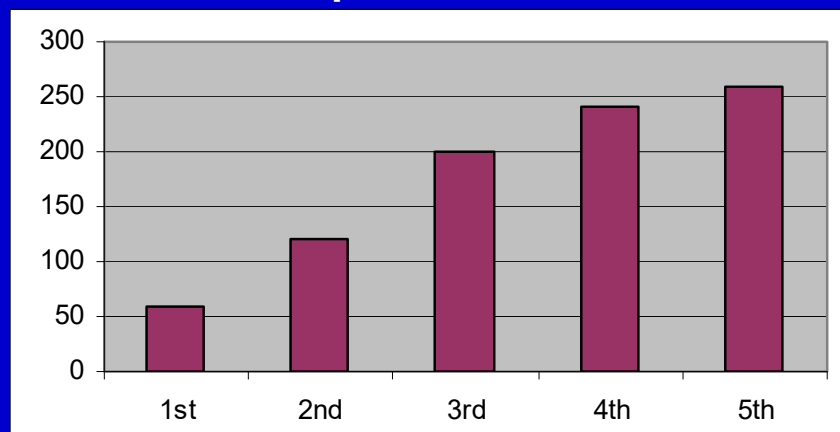


Industrial Performance Targets

Factory Efficiency in %



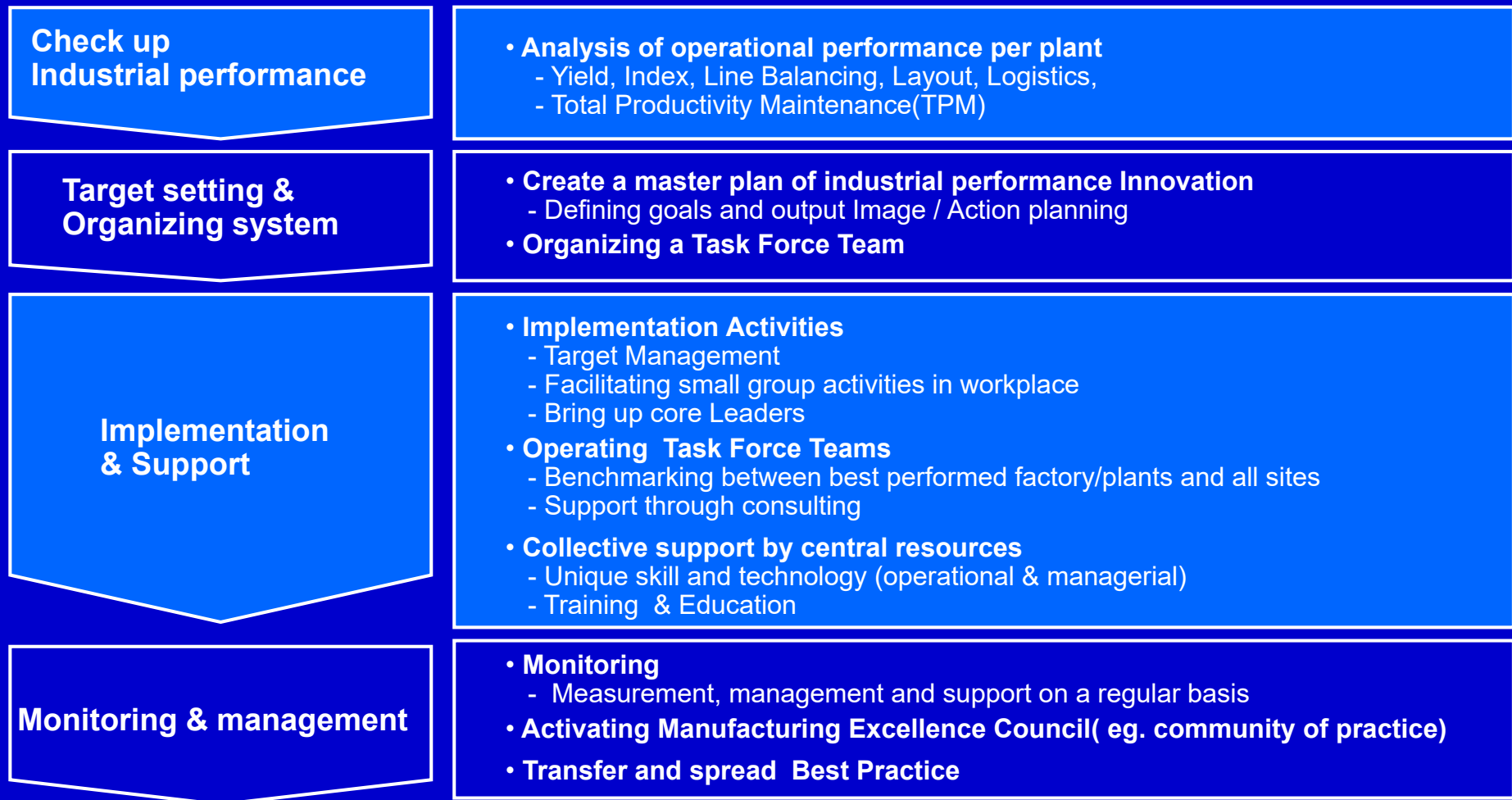
IFO Improved in M USD



How to achieve

1. Set up Manufacturing Excellence Council as steering committee
2. Building Innovation system
 - Check up & Evaluation
 - Form Task Force Team
 - Benchmarking & Programming
3. Applying strong points of both parties
 - Manufacturing technology
 - Process innovation technology
 - Process management technology
4. Making an exemplary plant to be supported by Central resources
 - 1 Plant for CPT / 1 Plant for CDT
 - Spread all sites and secure the best factory efficiency

Improvement Process.



Purchasing synergies

Purchasing Synergies

Short term

- Compare (product by product) prices, terms and conditions of comparable items from common suppliers to cash in the difference.
- Conduct low price leveling for common and comparable items from different suppliers to cash in the difference.
- Go out to suppliers in all regions to aggressively re-negotiate LG.PHILIPS Displays prices and conditions to reflect latest market conditions.
- Exploit combined global logistics networks to expedite cost reduction.

Mid / Long term

- Fully explore our strategic supplier status in the market due to LG.PHILIPS Displays scale to ensure price & supply advantage over our competitors(e.g. glass allocation)
- Develop common long term supply market strategies per component.
 - Benchmarking items from different suppliers and improve cost through leveraging and moving allocations(supplier capacities allowing)

Detail Action Plan

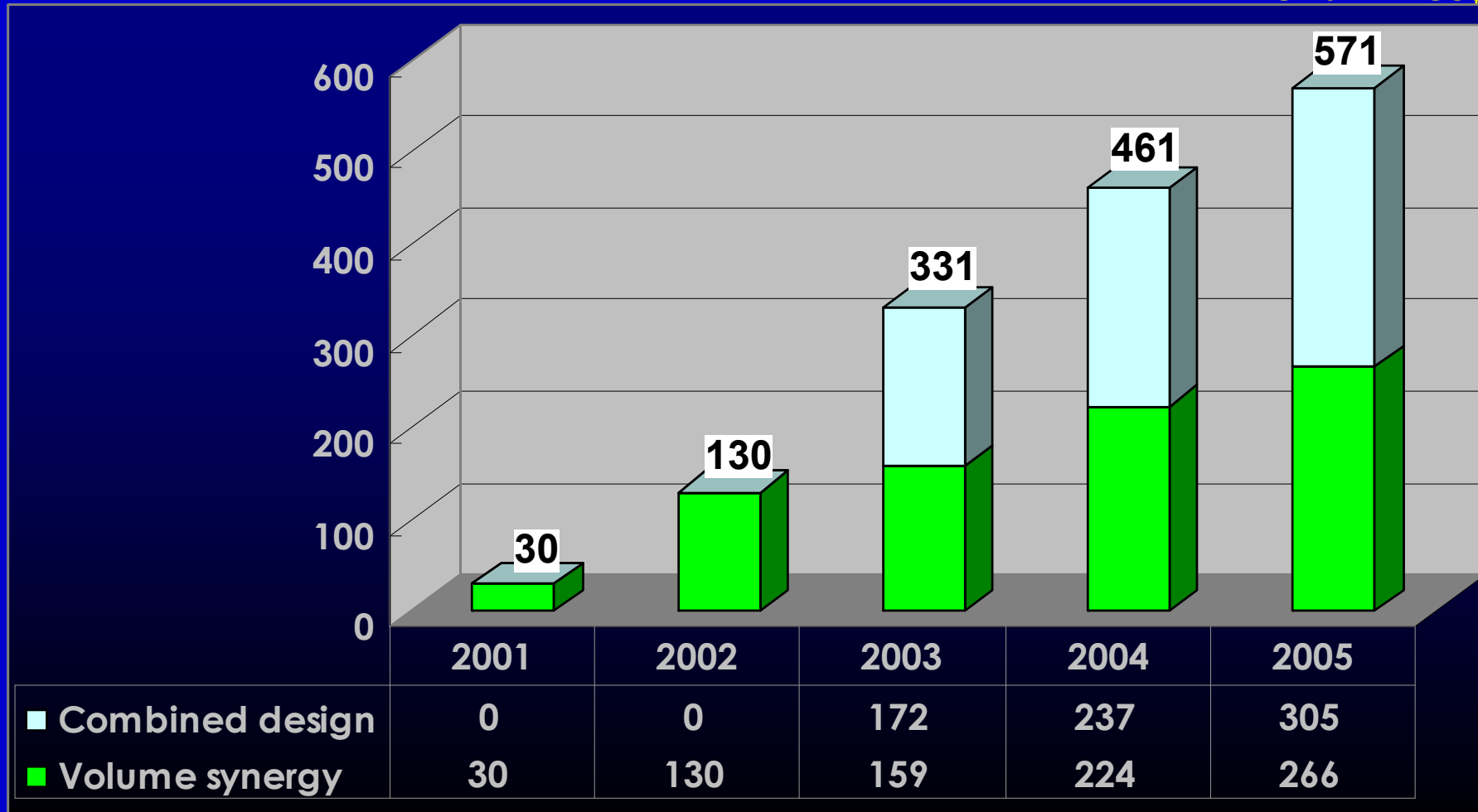
JBP team and competence team will be organized to create short term and long term real synergy savings through various cost-down activities.

2001.04		2002.01	
Schedule	Short Term	Mid/Long Term	
Organize Team	<ul style="list-style-type: none"> • JBP Team (HQ Members & each entity purchasing manager) 	<ul style="list-style-type: none"> • Competence Team (R&D, Purchasing, Manufacturing, industrial engineering) 	
Activity	<ul style="list-style-type: none"> • Establishment of Role (HQ, Region, Local) • Compare & analyze volume, prices, specification per item/vendor/region • Make price negotiation plans per item/vendor/region • Low price leveling & volume consolidating negotiation 	<ul style="list-style-type: none"> • Establishment of Purchasing strategy (Mid/Long Term) • Standardization and Common specification • Screening competitive suppliers • Develop new suppliers in growing region(e.g. find gun components & CMT mask suppliers in China) • Standardization of Code (Item, Vendor) 	

Synergy Savings (Amount)

Global Total

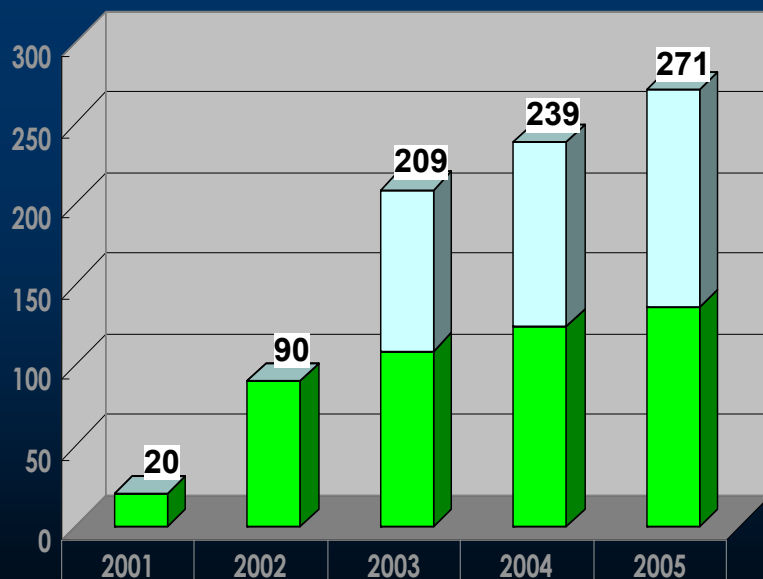
Unit : mill US\$



Synergy Savings (CDT Amount, CPT Amount)

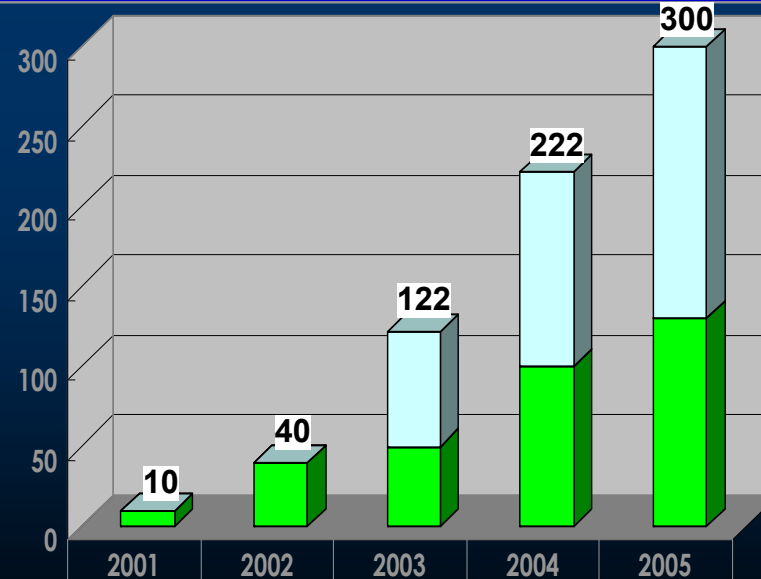
Global CDT(CMT)

Unit : mill US\$



Global CPT(TVT)

Unit : mill US\$



■ Combined design
 ■ Volume synergy

Purchasing Synergy Savings

Risks

Synergy savings in the market for glass will be difficult in the medium term due to temporary unbalance between demand and supply.

Even though LG.PHILIPS Displays are much bigger as a JV, Asahi and NEG maintain a strong position due to the demand/supply situation.

Opportunities

Our strategy is to achieve competitive price (and supply) advantage through the LG.PHILIPS Displays scale by global agreements with Asahi and NEG due to our enhanced strategic customer status. Also joint ventures, such as Anfei project in China and partnerships such as Schott in Europe.

We will exploit the short term downturn in the CDT business to improve glass prices.

(Faster) penetration of LCD into the CDT market during the review period will also change the demand/supply balance.

Re: section 8 Risk Assessment Tornado

Industrial projects

- Business Plan**
Page 61

Fei Ma

- Relocation 5 CDT lines from Dapon to Nanjing
- Proposal included in Joint Business Plan (use Fei Long Jumbo TVT building)
- Investment
 - Building/Utilities US\$ 45 mln
(Land/Building - US\$30M - low cost lease option may be available)
 - Equipment US\$ 35 mln
US\$ 80 mln
 - Restructuring Cost (incl. DU) US\$ 27 mln
 - Cashflow improvement (10 years) US\$ 500 mln
 - Cum NPV US\$ 200 mln
- Status - alternatives being examined:
 - New Building - low cost lease - in Nanjing Development
 - New Building - low cost lease - outside Nanjing
 - Location Changsha

Quest

- Install 1 1/2 large/jumbo flexible lines using newly acquired equipment and Zenith equipment
- Relocation of two large existing lines from the Ottawa, Ohio US
- BoM approval 03.04.2000 for \$221 million; an additional approval would be required to install the remaining jumbo backend and the third line from Ottawa
- Expected investment profile:

- Building/utilities	US\$ 79 mln
- New equipment	US\$ 108 mln
- Refurbishing	US\$ 34 mln
Total Capex	US\$ 221 mln
- Cumulative NPV	US\$ 383 mln
- Status:
 - The first backend (Zenith) will process 27V PMAs from Ottawa in Q3
 - The first new jumbo line will produce 27VRF product starting in Q4

Rapide (Phase I)

- Relocation of existing CPT capacity to Eastern Europe and installation of new Jumbo capacity in Czech Republic
- BoM approval 22.02.2000
- Investment

- Building/utilities	Euro 60 mln
----------------------	-------------

- Equipment	Euro 127 mln
-------------	--------------

	Euro 187 mln
--	--------------

- Initial/relocation cost	Euro 9 mln
---------------------------	------------

- Incentives (Disc. total project)	Euro 187 mln
------------------------------------	--------------

- CUM incr. NPV (excl. incentives)	Euro 245 mln (to 2008)
------------------------------------	------------------------

- Status:
 - on track
 - production start 2 lines; August 2001
 - installation 2nd Jumbo line in 2001

Agenda shareholder meeting March 9th

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1. Assumptions

Scope : CRT,DU, GUN (Excluding Glass,FBT,Yoke Ring ,PDP)

Produced in conformity with US GAAP

- **Sales : Based on quantity / price agreed upon by 1st GMT Meeting (HK,6~8 Feb)**
- **P/L, B/S, Cash Flow**
 - Consolidated financial plans of four Regions
 - R&D, IT integration, HQ Expense are factored into as Corporate Expense
 - Interest : Calculated by respective interest rates X outstanding balances of loan and bank accounts
 - Tax : Apply statutory tax ratio, in addition considers tax incentives to countries including Korea, Czche, Mexico, China
- **Capex : Includes restructuring and ordinary investments**
- **FX Rate : Apply FX rate of '01 ~ '05 in Strategic Review 2000 of Philips**
- **Risk & opportunity Assessment**
 - '01 and '02 plan evaluation : focused on 5 - 6 most influential factors
- **Business Plan for Shareholder Meeting :**
 - Actual of '2000 and plans from '2001 to '2005
- **Business Plan for Banking Committee :**
 - Actual of '1998 and '1999 will be added

2. Sales

	(M US\$)						
	2000	2001	2002	2003	2004	2005	CAGR ('01 ~ '05)
Europe	1,574	1,775	1,970	2,069	2,197	2,344	7.2%
Americas	786	926	1,270	1,404	1,472	1,600	14.7%
China	1,555	1,816	2,214	2,802	3,196	3,434	17.3%
Asia Pacific	2,173	2,377	2,838	3,015	3,242	3,420	9.5%
Eliminations	-644	-670	-1,030	-1,170	-1,412	-1,676	
Total	5,445	6,224	7,261	8,120	8,695	9,122	10.0%
(Growth ratio)	5.0%	14.3%	16.7%	11.8%	7.1%	4.9%	

* Eliminations : Inter-regional supplies

- **Europe** - Witness greater demands in CPT (plan to increase production capacity, i.e.Czche)
- **Americas** - Increase proportion of high-end products, particularly in CPT
- Expect CDT volume increase in 2001 onwards: import from A/P (*synergy effects JV*)
- **China** - Strengthen leadership position at this fast growing market
- Develop closer customer relationship & competitive/creative products to achieve core competence as a top player
- **Asia Pacific** - Improve Product-Mix (from Conventional to Flatron or EasyFlat)
- Further develop inter-regional supply (*synergy effects JV*)
- **Optimize inter-regional supply structure to maximize cost advantage, production efficiency, and production capacity (*synergy effects JV*)**

3. P/L

(M U\$)

	2000	2001	2002	2003	2004	2005
<i>Sales</i>	5,445	6,224	7,261	8,120	8,695	9,122
<i>Cost of sales</i>	4,600	5,362	6,126	6,666	7,045	7,297
<i>Gross Profit</i>	845	862	1,135	1,454	1,650	1,825
<i>(% in sales)</i>	15.5%	13.8%	15.6%	17.9%	19.0%	20.0%
<i>Selling Expenses</i>	97	90	105	115	121	126
<i>G&A Expenses</i>	191	225	267	301	299	294
<i>Income from Operation</i>	557	547	762	1,038	1,230	1,405
<i>(% in sales)</i>	10.2%	8.8%	10.5%	12.8%	14.1%	15.4%
<i>Non Operating Income</i>	-51	-50	-23	-35	-72	-46
<i>Interest</i>		105	94	74	26	-24
<i>Income before taxes</i>	506	392	645	929	1,132	1,382
<i>(% in sales)</i>	9.3%	6.3%	8.9%	11.4%	13.0%	15.2%
<i>Income taxes</i>	99	86	115	172	180	250
<i>Net Income</i>	406	306	530	757	953	1,132
<i>(% in sales)</i>	7.5%	4.9%	7.3%	9.3%	11.0%	12.4%

- Experience deterioration in margin & profit in 2001, recovery from 2002 by efficiency improvement and material cost saving
- Materialize positive effects Of Restructuring in Europe, Americas and China from 2003
 - move to the low cost area with improved efficiency & focus on highly profitable L/J and Flat segments
- Achieve competitive cost structure to better serve in a matured market
 - continuous model-mix improvement
 - strategic global supplier network & production excellence & innovation

Gross Profit (per Region)

Europe	'01	'02	'03	'04	'05	Total ('01~'05)
Sales & Supplies	1,775	1,970	2,069	2,197	2,344	10,354
Product	95.0%	98.8%	97.2%	96.5%	95.8%	96.7%
Import	5.0%	1.2%	2.8%	3.5%	4.2%	3.3%
Gross profit	197	282	361	371	450	1,661
	11.1%	14.3%	17.4%	16.9%	19.2%	16.0%
Product	11.5%	14.4%	17.8%	17.3%	19.9%	16.4%
Import	4.1%	7.1%	6.5%	6.0%	4.0%	5.1%

China	'01	'02	'03	'04	'05	Total ('01~'05)
Sales & Supplies	1,816	2,214	2,802	3,196	3,434	13,462
Product	68.2%	72.3%	72.8%	70.1%	71.0%	71.0%
Import	31.8%	27.7%	27.2%	29.9%	29.0%	29.0%
Gross profit	160	261	364	424	444	1,653
	8.8%	11.8%	13.0%	13.3%	12.9%	12.3%
Product	11.7%	15.0%	16.7%	17.6%	17.0%	16.0%
Import	2.7%	3.3%	3.1%	3.2%	3.1%	3.1%

Americas	'01	'02	'03	'04	'05	Total ('01~'05)
Sales & Supplies	926	1,270	1,404	1,472	1,600	6,670
Product	99.2%	68.3%	68.3%	69.2%	66.5%	72.4%
Import	0.8%	31.7%	31.7%	30.8%	33.5%	27.6%
Gross Profit	95	73	136	189	214	707
	10.3%	5.8%	9.7%	12.8%	13.4%	10.6%
Product	10.2%	7.4%	12.9%	17.5%	18.4%	13.6%
Import	15.7%	2.2%	2.6%	2.4%	3.2%	2.7%

Asia-Pacific	'01	'02	'03	'04	'05	Total ('01~'05)
Sales & Supplies	2,377	2,838	3,015	3,242	3,420	14,892
Product	94.5%	96.9%	96.9%	96.0%	95.7%	96.0%
Import	5.5%	3.1%	3.1%	4.0%	4.3%	4.0%
Gross Profit	410	518	594	667	718	2,908
	17.2%	18.3%	19.7%	20.6%	21.0%	19.5%
Product	18.3%	18.8%	20.3%	21.4%	21.9%	20.3%
Import	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

* 1. Product refers to local production 2. Import refers to regional supplies

- **Accomplish cost reduction through**
 - restructuring in Europe, Americas and China (relocating lines to low-cost areas) and material cost saving
- **China**
 - Large import volume and heavy investment in 2001 and 2002 allocated for restructuring and new line installation result in higher cost than Asia-Pacific

Gross Profit - CPT/CDT

(M U\$)

	'00	'01	'02	'03	'04	'05	'01~'05
CPT sales	3,411	3,893	4,366	4,744	5,019	5,227	59.0%
Gross Profit	479	603	693	863	979	1,108	61.3%
(%)	14.0%	15.5%	15.9%	18.2%	19.5%	21.2%	
CDT sales	2,034	2,330	2,894	3,376	3,677	3,895	41.0%
Gross Profit	366	259	442	591	671	717	38.7%
(%)	18.0%	11.1%	15.3%	17.5%	18.2%	18.4%	
Total sales	5,445	6,223	7,260	8,120	8,696	9,122	100%
Gross Profit	845	862	1,135	1,454	1,650	1,825	100%
(%)	15.5%	13.8%	15.6%	17.9%	19.0%	20.0%	

- Sales composition as well as gross profit of CPT and CDT is 6 to 4
- CPT gross profit demonstrates steady growth
- CDT gross profit displays deep downturn due to market deterioration in 2001 and gradually recover from 2002, still no greater further growth potential.

IFO (Income from Operation)

(M U\$)

	2000	2001	2002	2003	2004	2005
<i>Europe</i>	91	163	245	320	328	407
<i>Americas</i>	56	68	46	108	161	186
<i>China</i>	131	129	223	319	376	395
<i>Asia Pacific</i>	427	353	455	529	598	644
<i>Corp. expenses</i>	-149	-165	-206	-237	-234	-227
<i>Total</i>	557	547	762	1,038	1,230	1,405

	2000	2001	2002	2003	2004	2005
<i>Europe</i>	5.8%	9.2%	12.4%	15.5%	14.9%	17.4%
<i>Americas</i>	7.1%	7.3%	3.6%	7.7%	10.9%	11.6%
<i>China</i>	8.4%	7.1%	10.1%	11.4%	11.8%	11.5%
<i>Asia Pacific</i>	19.6%	14.8%	16.0%	17.5%	18.4%	18.8%
<i>Corp. expenses</i>						
<i>Total</i>	10.2%	8.8%	10.5%	12.8%	14.1%	15.4%

- Restructuring and purchasing synergy lead to profit enhancement
- Sales growth, mix improvement and completion of restructuring lead to profit enhancement in Europe
- Start-up cost at the Mexico operation and lower margin import result in drastic profit contraction in Americas
- CDT Price erosion (- 15%) and under-loading are the consequences of over capacity in Chinese and A/P CDT markets in 2001.
- Severe under-loading and CDT price erosion in China lead to profit deterioration of 2001, improvement in production efficiency & product mix contributes to the profit recovery in 2002.

IFO Analysis

(M U\$)

	2001	2002	2003	2004	2005
<i>IFO Previous</i>	557	547	762	1,038	1,230
<i>Contribution Margin</i>	171	439	344	190	146
<i>Volume changes</i>	155	270	166	68	132
<i>Selling price</i>	(430)	(321)	(207)	(246)	(221)
<i>Material usage/price</i>	270	263	179	172	164
<i>Mix/other changes</i>	69	195	133	175	(8)
<i>Cost of Organization</i>	(139)	(177)	(39)	(1)	24
<i>Others</i>	(42)	(47)	(30)	3	5
<i>IFO Current</i>	547	762	1,038	1,230	1,405

*Contribution Margin : Sales - Material cost / Cost of Organization : Manufacturing cost and selling expenses

- **Rationale of estimated profit enhancement:**

- Sales growth
- Material cost saving compensates price erosion of tubes
- Realized mix improvement of all regions

- **Cost of organization**

- Temporary wage increase during line relocation period and start-up cost related to line transfer in 2001/2002 will expand cost of organization
- Sales related cost increases as sales volume grows
- Positive restructuring effects will be realized after 2003

- **Others include IT integration cost, R & D expenses and HQ expenses**

Corporate Expenses

(M U\$)

	2000	2001	2002	2003	2004	2005
<i>Sales</i>	5,445	6,224	7,261	8,120	8,695	9,122
<i>Corporate Expenses</i>						
1. <i>R&D Expenses</i>	113	124	145	162	174	182
2. <i>IT Integration Costs</i>		5	16	30	15	
3. <i>HQ Expenses</i>	36	36	45	45	45	45
<i>TOTAL</i>	149	165	206	237	234	227
<i>(% in Sales)</i>	2.7%	2.7%	2.8%	2.9%	2.7%	2.5%

- **R&D Expenses : 2% of sales**

- Includes Corporate expenses, which covers Corporate-wise R&D LAB Expenses in Eindhoven, Kumi and regionally distributed expense, which deals with local development on behalf of CTO-Office in sites

- **IT Integration Expenses : Build-up integrated system for Newco**

- **HQ Expenses : Total cost of new HQ of JV**

- assuming that HQ office locates in Hong Kong
- Salary, Housing, IT & office maintenance costs
- HQ cost 2001 will be higher due to start-up and half year cost in Hong Kong.

4. Net Assets

	2001	2002	2003	2004	2005
<i>Current Assets</i>	1,490	1,700	1,857	1,913	1,975
- A/R	1,050	1,196	1,319	1,370	1,424
- Inventory	388	446	475	483	489
<i>Fixed Assets</i>	2,720	2,831	2,678	2,487	2,305
<i>Total Assets</i>	4,213	4,534	4,538	4,404	4,283
<i>(% in sales)</i>	67.7%	62.4%	55.9%	50.6%	47.0%
<i>Liabilities</i>	-1,324	-1,409	-1,571	-1,602	-1,609
- A/P	-1,048	-1,127	-1,258	-1,318	-1,362
- Others	-276	-282	-313	-284	-247
<i>Net Assets</i>	2,889	3,124	2,967	2,802	2,674
<i>(% in sales)</i>	46.4%	43.0%	36.5%	32.2%	29.3%

< Turnover >

	2001	2002	2003	2004	2005
<i>Working capital</i>	390	515	536	535	552
<i>(% in Sales)</i>	6.3%	7.1%	6.6%	6.1%	6.0%

* Turnover : year end basis, in % of sales

• Improvement in Asset turnover achieved by

- Better loading of facilities / efficient management of working capital
- Heavy Investment for restructuring, line expansion & capacity build-up in '01, '02

5. Cash Flow(Excluding dividend payment) (M U\$)

	2001	2002	2003	2004	2005
<i>Cash In</i>	911	1,248	1,643	1,694	1,853
<i>Operational Income</i>	547	762	1,038	1,230	1,405
<i>Depreciation & N.O.I.</i>	342	401	444	433	442
<i>Changes in AP& O.C.L.</i>	22	85	162	31	7
<i>Cash Out</i>	-766	-745	-484	-404	-402
<i>Capex</i>	-656	-535	-327	-347	-341
<i>Changes in AR& O.C.A.</i>	-245	-152	-128	-49	-55
<i>Changes in Inventory</i>	136	-58	-29	-8	-6
<i>Cashflow from operation</i>	145	503	1,160	1,290	1,451
<i>Interest & Taxes</i>	-191	-209	-246	-206	-226
<i>Net Cash Flow</i>	-46	295	914	1,084	1,225
<i>Dividend</i>					

* Net Cash Flow generated by the operation

* N.O.I. : Non-Operating Income , O.C.L. : Other Current Liabilities, O.C.A. : Other Current Assets

- **Operational income is a main contributor to Cash in**

- Accomplishing the target considers as one of the most important strategic issues for the success of J/V

- **Interest with an assumption of \$ 1.5 B bank loan**

- Valuation gap : \$ 1.1 B, working capital : 200M, early investment : \$ 200 M

6. CAPEX

(M U\$)

	2001	2002	2003	2004	2005	'01 ~ '05
<i>Europe</i>	218	181	158	147	146	850
<i>Americas</i>	139	71	56	62	59	387
<i>China</i>	249	217	36	48	38	588
<i>Asia Pacific</i>	50	66	77	90	98	381
Total	656	535	327	347	341	2,206

(M U\$)

< Capex details >

		2001	2002	2003	2004	2005
Restructuring & Relocation	<i>- Rapide(to Czeckia)</i>	38	20	42	51	33
	<i>- Quest (to Mexico)</i>	7	54	42		
	<i>- Fei Ma (Taiwan to China)</i>	80				
New product & Capacity (Incl. Flat & FIT)	<i>- CPT (incl. Fei Long Pjt.)</i>	278	204	61	66	66
	<i>- CDT</i>	222	106	17	20	19
Ordinary investment & Replacement		31	151	165	210	223
Total		656	535	327	347	341

7. EPR/EVA

(M US\$)

	2001	2002	2003	2004	2005
<i>Income before taxes (excluding interest)</i>	497	739	1,003	1,158	1,358
<i>Income taxes</i>	86	115	172	180	250
<i>Income after taxes</i>	411	624	831	979	1,108
<i>Capital Cost</i>	326	361	365	346	329
<i>EPR / EVA</i>	85	264	466	632	780
<i>as % of Net Assets</i>	3.2%	8.8%	15.3%	21.9%	28.5%
<i>Capital Cost in % Average Net Assets</i>	12.0% 2,713	12.0% 3,006	12.0% 3,046	12.0% 2,884	12.0% 2,738

* EPR : Economic Profit Realized, EVA : Economic Value Added

- **Enhanced Annual EPR factors into**
 - Income increase
 - Asset turnover improvement
- **Taxes**
 - Statutory tax rates
 - Korea, Czech, Mexico, China : beneficiary of tax incentive extended for foreign investments

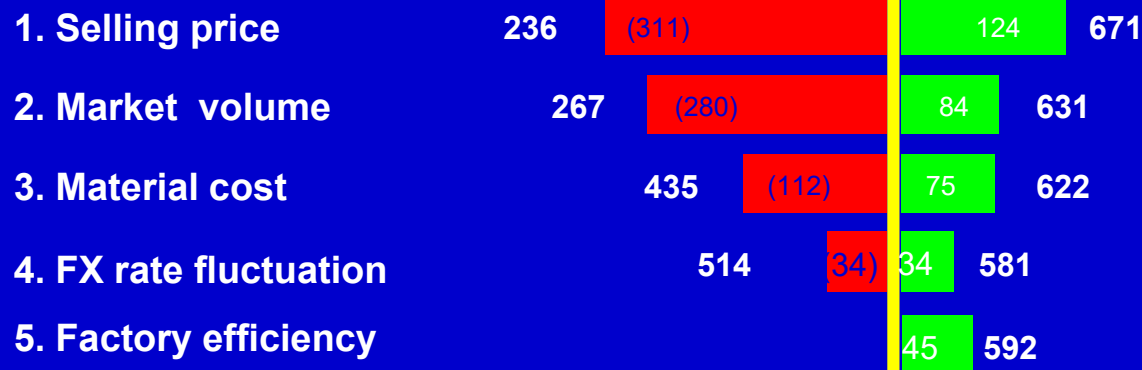
8. Risk & Opportunity Assessment - 2001

Tornado 2001

(M U\$)

<u>Risk /Opportunity factors</u>	+	-	IFO Impact	
1. Selling price (+:shortage in market, -:erosion)	2%	-5%	124	-311
2. Market volume(+: Market growth, -:recession)	3%	-10%	84	-280
3. Material cost (+:efficiency, -:shortage)	2%	-3%	75	-112
4. FX rate fluctuation (+:strong EURO/WON, - weak EURO/WON)	10%	-10%	34	-34
5. Factory efficiency(+:improvement)	3%		45	
			362	-737

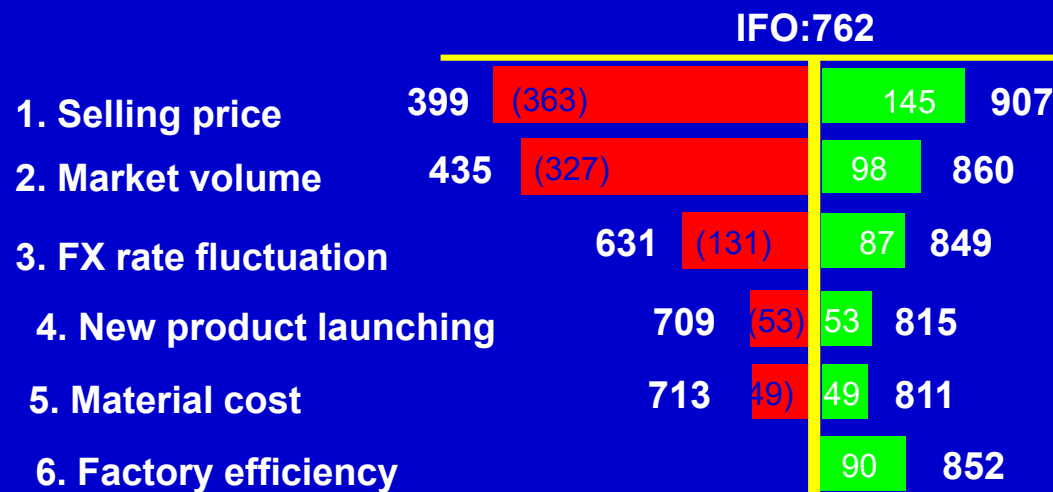
IFO:547



8. Risk Assessment - 2002

Tornado 2002

<u>Risk /Opportunity factors</u>	+	-	IFO Impact	
1. Selling price (+:shortage in market, -:erosion)	2%	-5%	145	-363
2. Market volume(+: Market growth, -:recession)	3%	-10%	98	-327
3. Material cost (+:efficiency, -:shortage)	2%	-3%	87	-131
4. FX rate fluctuation (+:strong EURO/WON, - weak EURO/WON)	10%	-10%	53	-53
5. New product launching (+: improved throughput-time, -:Delays)	5%	-5%	49	-49
6. Factory efficiency(+:improvement)	6%		90	
			522	-923



Agenda shareholder meeting March 9th

16:00	Introduction	P. Combes
	Key assumptions	
16:15	- Scope	G. Leborgne
16:25	- Market	G. Leborgne
16:55	- Sales	KS Cho
17:25	- Innovation	G. Leborgne
17:45	- Industrial	P. Combes
18:30	Financials	KJ Lee
19:40	Financing	H olde Bolhaar
20:00	Integration Process	P. Combes
20:20	Conclusion	P. Combes
21:00	Closure	

Cash Flow - CRT only; excludes Glass, Yokes, FBT, PDP

(USD Mio)	2001	2002	2003	2004	2005
I. Net Income	306	530	757	953	1132
- Depreciation	392	424	479	506	490
II. Operating Cash Flow	698	954	1236	1459	1622
Change in Working Capital	(94)	(125)	7	(27)	(54)
III. Cash flow from Operation	604	829	1243	1433	1568
- Investments	(656)	(535)	(327)	(315)	(308)
- Valuation Gap	(1100)				
IV. Cash flow before financing	(1152)	295	916	1118	1260
V. Cash flow from financing	1346	(168)	(773)	(774)	(838)
- Financing/New Debt	1400	100			
- Repayment of Debt	(54)	(268)	(522)	(425)	(399)
- Dividends			(251)	(349)	(439)
VI. Net Cash Flow	194	127	143	344	422

Key Financial Guidelines

1. Capital Structure Policy

Objective: To lower the effective interest costs of the LG.Philips Displays on an after-tax basis.

Mission: Implementation of an optimal capital structure in the various countries where the Group is active after considering the implied risks (currency, interest, commercial and country) constraints and opportunities (legal, fiscal and accounting regulations).

Basic Rules:

- Capital structure in the operating entities is “Minimum Equity - Maximum Debt”;
- Debt should preferably be Inter-Company Loans from the Holding Co to optimise balance sheet;
- Debt should be denominated in the local functional currency to reduce foreign exchange exposures;

2. Guarantee Policy

- Guarantees related to credit facilities should be issued by the Holding Company;
- Soft-guarantees like Letters of Comfort or verbal assurances are to be avoided.

3. Banking Policy

- Banks in the lending syndicate will be the only banks that should be used globally;
- Use of non-core banks will need to be approved by the Global Treasury of LG.PHILIPS Displays;

Key Financial Guidelines

4. Dividend Policy

- Present JV Agreement : 50% pay-out ratio on Net Income
- Recommendation:
 - Flexible pay-out after meeting debt servicing and capex requirements
 - Dividends to be declared after the long term debt/equity target has been met

Interest bearing Debt/Equity Projected range:

2001	2002	2003
1.1-1.2	0.9-1.0	0.5-0.6

- long term debt/equity target of 50% is recommended

II. The summary of Financing Structure

1. Amount

- Payment for Valuation Gap : USD 1.1 billion
- Working Capital : USD 0.2 billion
- CAPEX : USD 0.2 billion

Total : USD 1.5 billion

2. Facility

Borrower : LG.PHILIPS Displays Holding Co. BV

Lenders : Bank syndicate

Classification	Tranch 1	Tranch 2	Tranch 3
Amount	1.1 billion	0.2 billion	0.2 billion
Tenor	5years (Grace period : 2yr)	3 years (R/C)	1 years (Bullet)
Interest	LIBOR + 110-120 bp	LIBOR + 110-120 bp	LIBOR + 80-90 bp
Management Fee	130 bp	130 bp	80 bp

All in cost approximately USD Libor + 130-150 bps, currently about 6.7- 7.0%

II. The summary of Financing Structure

3. Main Terms and Conditions

- Stand-alone financing, without parent guarantees
- Basic financial covenants eg. Debt / Net Worth, Debt / EBITDA. EBITDA / Interest Exp.
- Other covenants - Shareholding maintenance. Changes are subject to majority lenders' consent

<i>Projected Financial Ratios</i>	2001	2002	2003
• Debt/Net Worth	1.1-1.2	0.9-1.0	0.5-0.6
• Debt/EBITDA	1.9X	1.3X	0.7X
• EBITDA/Interest Expense	8.5X	12.4X	20X

4. Arranger and participant banks

- 1) Arranger Group : 2 ~ 3 Banks (Candidates : Citi , Chase, ABN-AMRO)
- 2) Sub- underwriter :
 - About 10-15 participant banks are expected
 - Arrangers will underwrite 100% of financed amount.
- 3) General Syndication Group : About 20 ~ 30 banks are expected

II. Summary of Financing Structure

5. Syndication Process and Strategy

- Two step syndication process;
- Road shows in Europe (London/Amsterdam) and Asia (HK/Singapore)
- One to one bank meetings
- Leveraging on parent banking relationships

Allocation of Debt to Operating Companies

1) Objective

- Suitable Debt/Equity ratio in view of the business environment
- Minimize tax payable (Tax deductibility of interest expenses)

2) Basic considerations

- Tax position of the local entity
- Withholding tax with the Netherlands
- Within debt service capacity of each legal entity (EBIT)
- Meet thin capital regulation of each country
- Considering the possible restructuring plans in the near future
- Considering legal/governance constraints (ie. China J/V)

III. Timetable for next steps

Task (plan)	Feb	Mar	Apr	May
• Request For Proposal (including JBP)		◇ March 19		
• Response from the 3 banks by 28 March;		March 28 ◇		
• Mandate to be awarded by 30 March;		March 30 ◇		
• End due diligence process Mandated bank's			◇ April 6	
• Start Sub-underwriting process			◇ April 9	
- Meeting with Sub-underwriting banks in Amsterdam or London			◇ April 17	
• Sub-underwriting group to be formed			◇ April 23	
• General syndication to begin			April 24 ◇	
• Road show in London or Amsterdam, HK and Singapore				May 2,3,4 May 9,10,11
• General syndications group to be formed				◇ May 18
• Legal documentation			April 9 ◇	◇ May 25
• Signing and closing				May 28 ◇
• Drawdown on or before June 1 is possible after signing.				

key GMT members should attend

GMT members to attend in at least 1 location

Agenda shareholder meeting March 9th

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Governance principles - 1

- One integrated Company
- One face to the customers / suppliers
- One Global strategy driving Regional strategies
- One Global plan (Marketing, Sales, Development, Operations, HRM) driving Regional plans
- Global policies and processes to be deployed in the Regions

Governance principles - 2

JV Global HQ 'owns'

Global Strategy

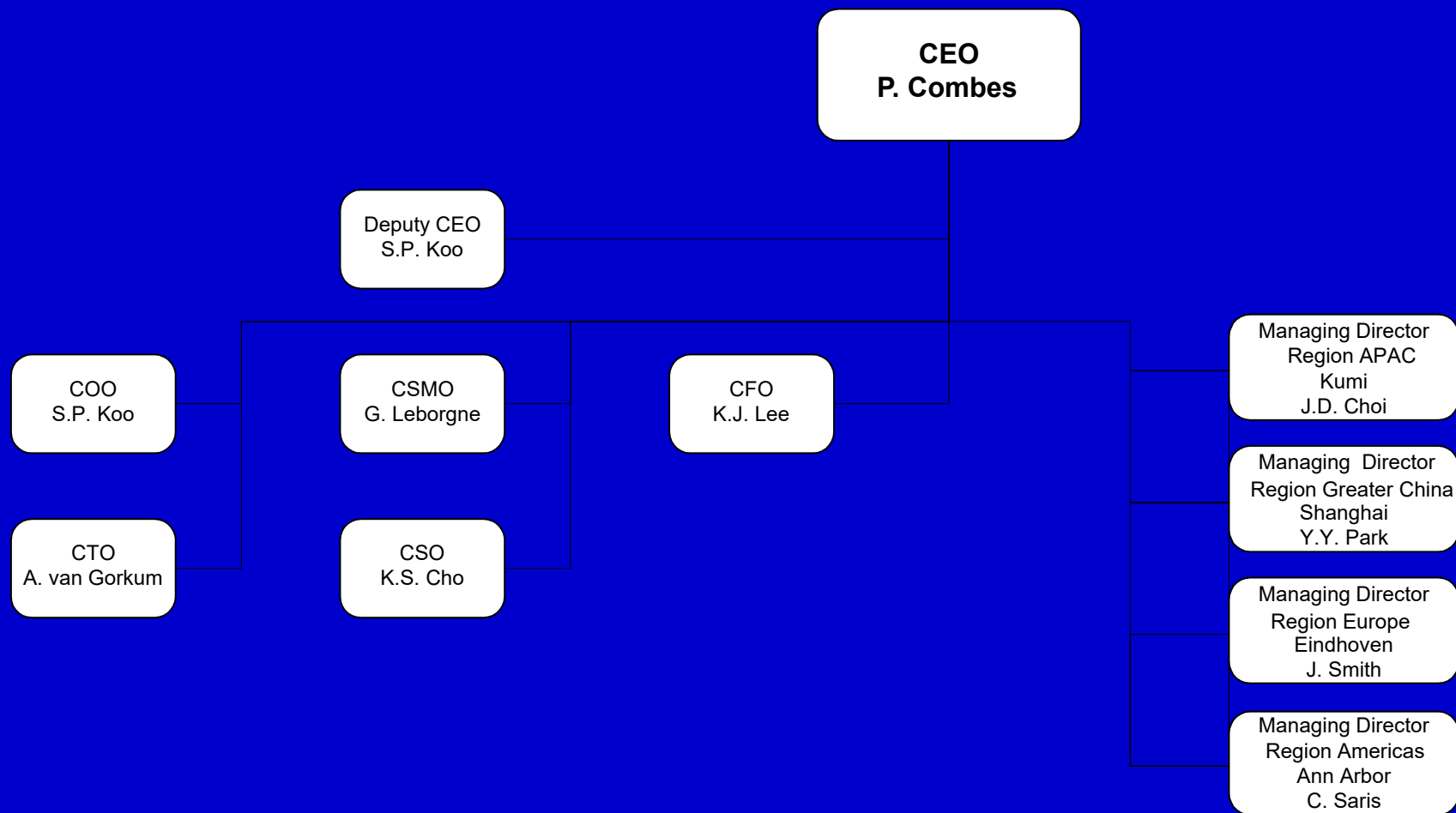
- **Global Planning**
- **Global Industrial Strategy**
- **Global Policies and Processes**
- **Global Innovation and product strategy**

Regions

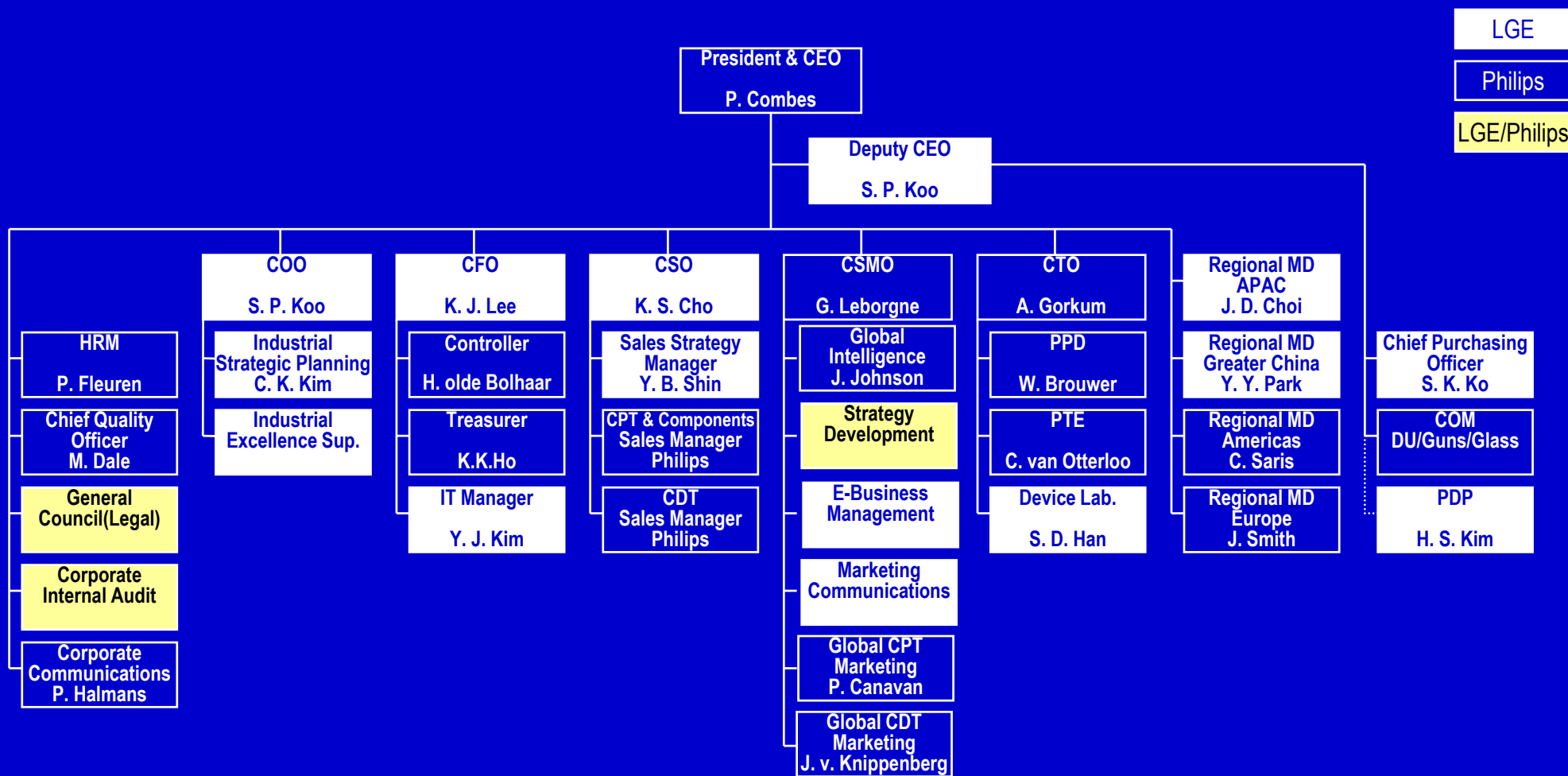
- **Contribute to the decision making on Global Strategy / Plan / etc.**
- **Deploy and implement in the region**
- **Accountable for regional results**

*Staffing of GMT,
Regions, Global HQ
in a balanced way
between LGE and
Philips*

Group Management Team



Global HQ



Integration-approach

- Agreed to go for a Managed Integration-process with external support: KPMG (Hans Bakker)
- Cultural dimension fully incorporated in the process
- Content and approach will be defined with full involvement of LGE and Philips: fully shared and owned by all GMT/Key Global HQ staff, kick-off planned April 11th.
- Integrated and phased approach with as starting point combine the strengths of both worlds

Phasing of the Integration Program & Deliverables - 1

- **Phase 1 Pre-planning & Executive Mobilisation**

- Shared understanding of the Mission-Vision
- Integration Program defined
- Integration Organisation including Program Management in place
- Key issues and risks identified : Key projects agreed
- Key Business Processes Day-1 agreed
- Integrational Learning Framework in place
- Communication Plan including Kick-Off event

Phasing of the Integration Program & Deliverables - 2

Phase 2 100 - Day Integration Planning

- Vision translated into a blue-print of the business-model:
- business-processes - governance - management- systems
- Detailed Implementation plan
- Quick Wins targeted

Phase 3 Implementation & Optimisation (couple of years)

- Maximised value generation (synergy-integration objectives)
- Implemented blue-print
- Shared experience and best practices
- Own shared culture
- Fully handed over to line and close down of integration program

Agenda shareholder meeting March 9th

16:00	Introduction	P. Combes
	Key assumptions	
16:15	- Scope of JBP	G. Leborgne
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Conclusions

- **LG.PHILIPS Displays is a growing, profitable and cash generating business.**
- **2001 / 2002 will be critical for the future success**
 - Difficult market environment
 - Restructuring
 - Early realization of synergies
- **Business risks in 2001 / 2002 require**
 - Contingency plan management in operations
 - Financing structure should allow to cover cash flow risk
- **Should a Management correction on 2001 / 2002 results be considered in view of the risks ?**
- **JBP2 will further detail, support and complement JBP1. It will**
 - Further reflect market trends and work done on synergies
 - Include additional actions to help trigger the CRT industry consolidation

Presentation Objectives - *Check*

- **Presenters:**
P.Combes, S.P. Koo, KJ Lee, H. olde Bolhaar, KS Cho, G Leborgne
- **Subject:** LG.PHILIPS Displays business plan
- **Objective:** We are here to inform and get the approval of both parents on the business plan we propose to submit to the banks.
- **Time:**
 - Presentation: 4hr. 35min
 - Q&A: during presentation
- **Feedback:**



LG.PHILIPS Displays



EXHIBIT 28

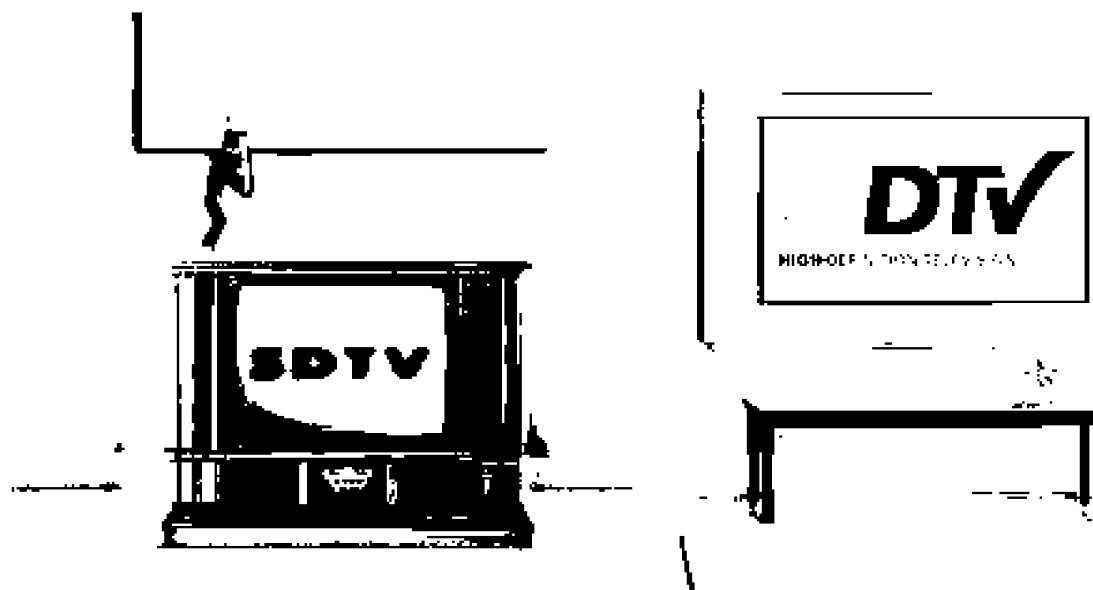
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Worldwide CDT Manufacturer's Status

Printed: 03-12-11		PRODUCTION (KP/M)										CAPACITY (KP/M)										LINES																														
Maker	Nationality	Region	Location	Size	96tIP	97tIP	98Q1P	98Q2P	98Q3P	98Q4P	98tIP	99Q1P	99Q2P	99Q3P	99Q4P	99tIP	00Q1P	00Q2P	00Q3P	00Q4P	00tIP	97tIC	98Q1C	98Q2C	98Q3C	98Q4C	98tIC	99Q1C	99Q2C	99Q3C	99Q4C	99tIC	00Q1C	00Q2C	00Q3C	00Q4C	00tIC	96Q4L	97Q4L	98Q1L	98Q2L	98Q3L	98Q4L	99Q1L	99Q2L	99Q3L	00Q1L	00Q2L	00Q3L	00Q4L		
5Makers	KOREA	OEC	KOREA	Kumi	14"	3,147	3,300	257	322	230	140	2,847	72	75	71	43	783	27	35	35	30	381	4,250	340	340	260	170	3,330	170	90	80	80	1,260	45	45	45	45	540	2.5	2.0	2.0	2.0	1.5	1.0	1.0	0.5	0.5	0.3	0.3	0.3	0.3	
5Makers	KOREA	OEC	KOREA	Kumi	15"	192	1,050	124	150	177	320	2,313	270	250	250	300	3,210	270	261	271	294	3,288	1,360	170	170	210	300	2,550	300	300	340	340	3,840	330	330	330	330	3,960	0.5	1.0	1.0	1.0	1.3	1.8	1.8	1.5	1.5	1.8	1.8	1.8	1.8	
5Makers	KOREA	OEC	KOREA	Kumi	17"						25	75	45	103	92	192	1,296	191	194	203	185	2,319				10	40	150	40	160	200	250	1,950	250	250	300	300	3,300				0.3	0.3	0.3	1.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
5Makers	KOREA	OEC	KOREA	Kumi	19"							0			1	25	78	7	3	23	1	102						0			10	50	180	50	50	50	600					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
5Makers	KOREA	OEC	Mexico	Mexico	15"							0	12	50	58	57	531	110	90	108	112	1,260						0	40	70	100	120	990	150	150	150	150	1,800						1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
5Makers	KOREA	OEC	CHINA	Gonsan	15"																																															
5Makers	KOREA	OEC	CHINA	Gonsan	17"																																															
5Makers	KOREA	LPD	KOREA	K/C	14"	2,731	2,100	160	120	80	60	1,260	70	45	30		435					0	2,700	180	90	90	90	1,350	80	80			480					0	1.5	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
5Makers	KOREA	LPD	KOREA	K/C	15"	2,907	4,600	455	467	430	520	5,616	500	450	600	680	6,690	550	550	520	300	5,760	4,700	510	590	510	510	6,360	570	550	620	700	7,320	600	550	550	500	6,600	2.5	3.0	3.0	3.5	3.0	3.5	3.0	3.5	3.0	3.0	3.0	3.0	3.0	
5Makers	KOREA	LPD	KOREA	K/C	17"	522	1,250	120	153	280	400	2,859	480	470	450	540	5,820	530	660	700	730	7,860	1,500	320	320	350	380	4,110	520	550	550	500	6,360	650	650	700	700	8,100	1.0	1.5	2.0	2.0	3.0	3.0	3.5	4.0	4.0	4.0	4.0	4.0	4.0	
5Makers	KOREA	LPD	KOREA	K/C	19"							156	55	65	55	90	795	150	173	175	128	1,878				30	50	240	60	80	90	90	960	170	170	170	170	2,040					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
5Makers	KOREA	LPD	UK	Wales	15"						10	65	225	70	60	100	120	100	130	130	1,380						80	80	80	80	80	960	170	170	170	170	2,040					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
5Makers	KOREA	LPD	UK	Wales	17"						10	60	210	80	100	100	110	1,170	120	140	140	150	1,650				40	100	420	120	150	150	150	170	1,980	160	160	170	170	1,980					1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
5Makers	KOREA	LPD	CHINA	Changsa	15"																																															
5Makers	KOREA	LPD	CHINA	Changsa	17"																																															
5Makers	TAIWAN	LPD	TAIWAN	D/C	14"	6,160	7,950	735	741	821	1,145	10,326	1,255	1,190	1,335	1,540	15,960	1,450	1,653	1,665	1,408	18,528																														
5Makers	TAIWAN	LPD	TAIWAN	D/C	15"	2,450	1,370	123	43	0	0	498	0	0	0	0	0	0	0	0	0	0	1,500	130	70	0	0	600						0	1,750	1,700	1,760	1,710	20,760	5.0	5.5											
5Makers	TAIWAN	LPD	TAIWAN	D/C	17"	3,300	4,010	290	350	340	440	4,260	380	355	350	350	4,305	220	200	120	50	1,770	4,300	410	480	450	420	5,280	420	370	300	300	4,170	280	140	140	140	2,100	5.0	6.0	6.0	7.0	7.0	6.0	6.0	5.0	4.0	4.0	2.0	2.0	2.0	2.0
5Makers	TAIWAN	LPD	TAIWAN	D/C	19"	70	690	90	110	160	230	1,770	210	230	240	270	2,850	170	200	170	120	1,980	1,000	130	130	200	210	2,010	210	250	350	350	3,480	350	280	280	280	3,570	1.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
5Makers	TAIWAN																																																			

Japan+Others	Thailand	THAI-CRT	Thailand	Thailand	17"													2	7	10	22	123						50	50	50	450																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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EXHIBIT 29



HDTV Forum 2004: Accelerating the HDTV Transition

August 24-26 - Los Angeles, California



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Andrew Shulklapper

Vice President, TV Market Research

DisplaySearch



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Outline



- Introduction to session
- Forecast Review
- Outlook: Concerns and Opportunities



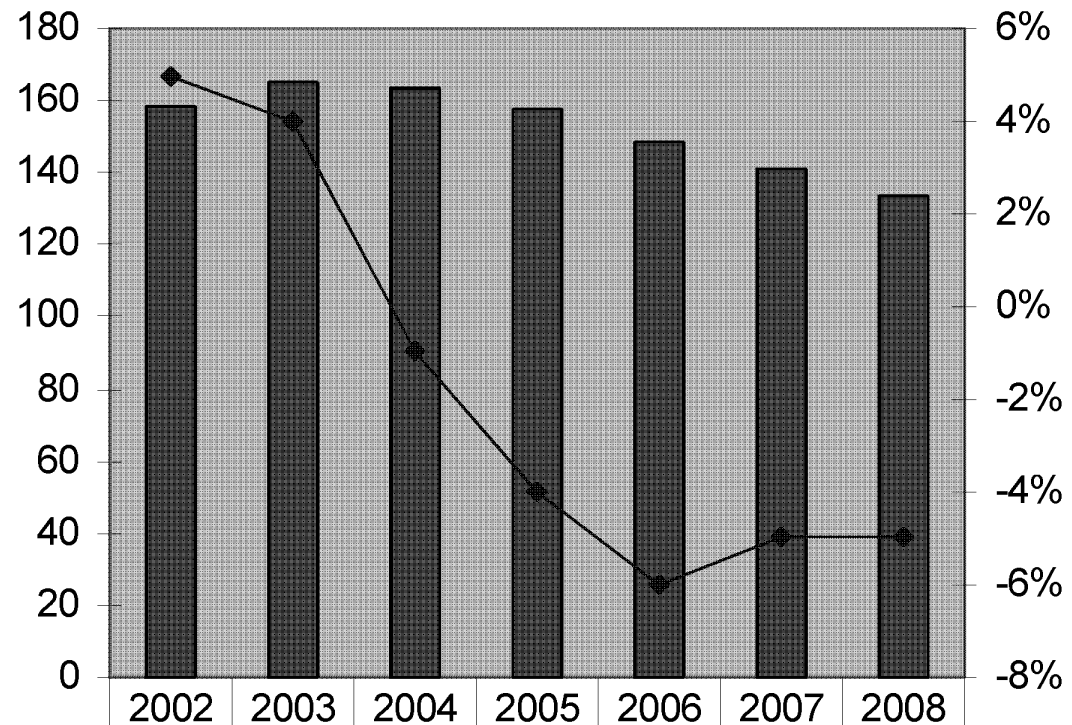
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Direct View CRT Sales Forecast



- Overall volume remains very high but suffers a steady decline over the forecast period

	CAGR
10"-21"	-6%
22"-32"	-1%
33"-39"	-2%
40"-49"	-100%
Total	-4%



■ Shipments in Millions	158.8	165	163	157	149	141	134
◆ Growth	5%	4%	-1%	-4%	-6%	-5%	-5%

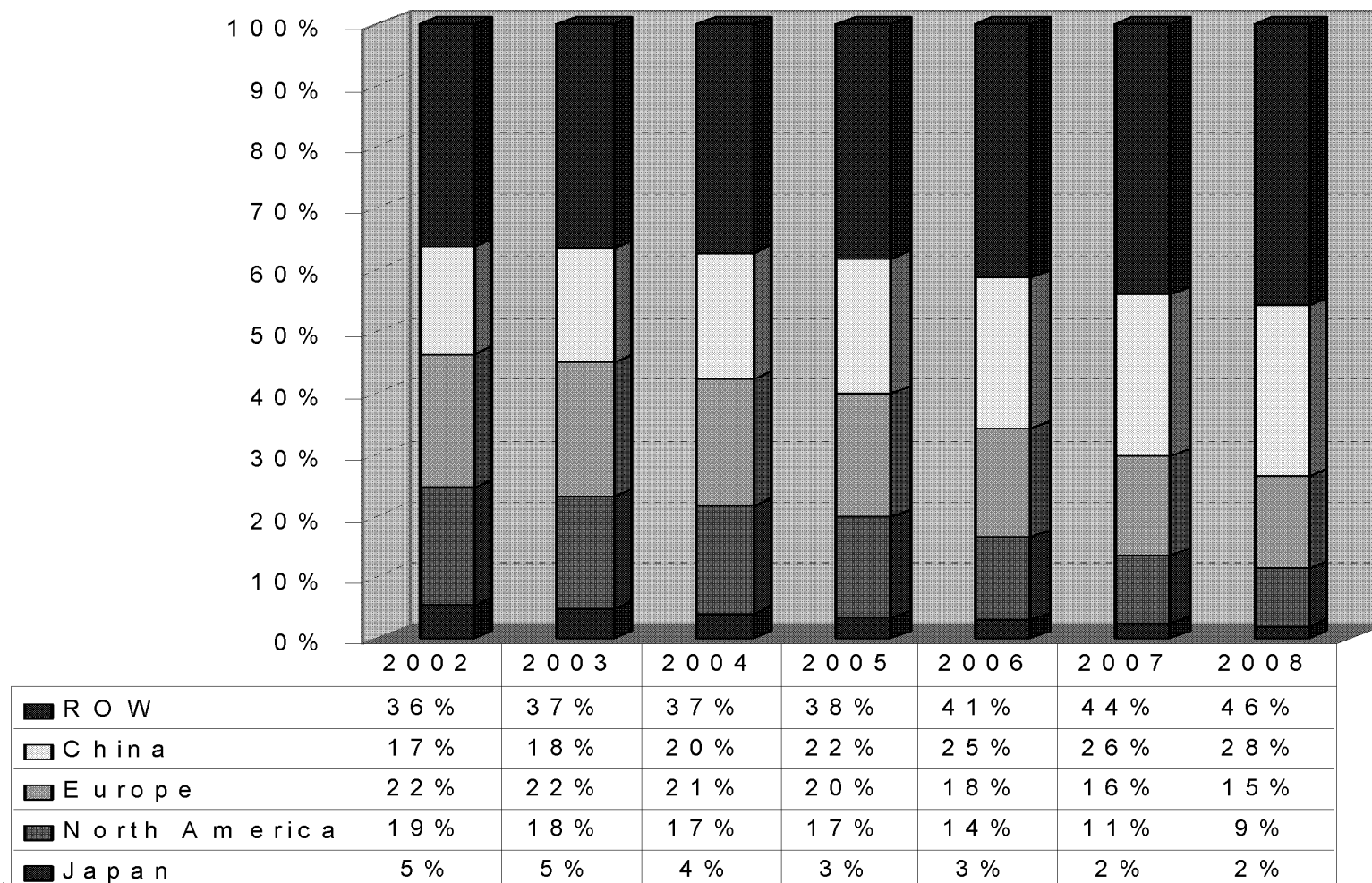


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CRT TV Shipments By Region



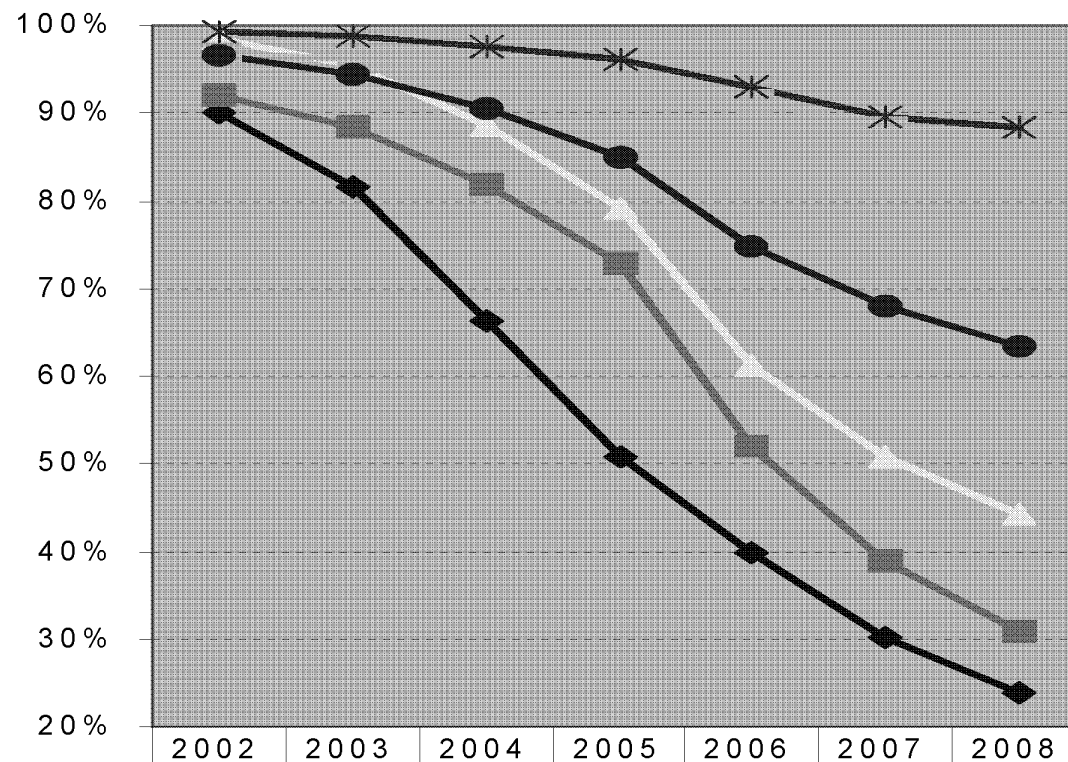
- China's total shipments rise, ROW flattens out and other regions decline



Regional Penetration of Total TV Shipments



- Penetration remains over 50% in only China and ROW by 2008



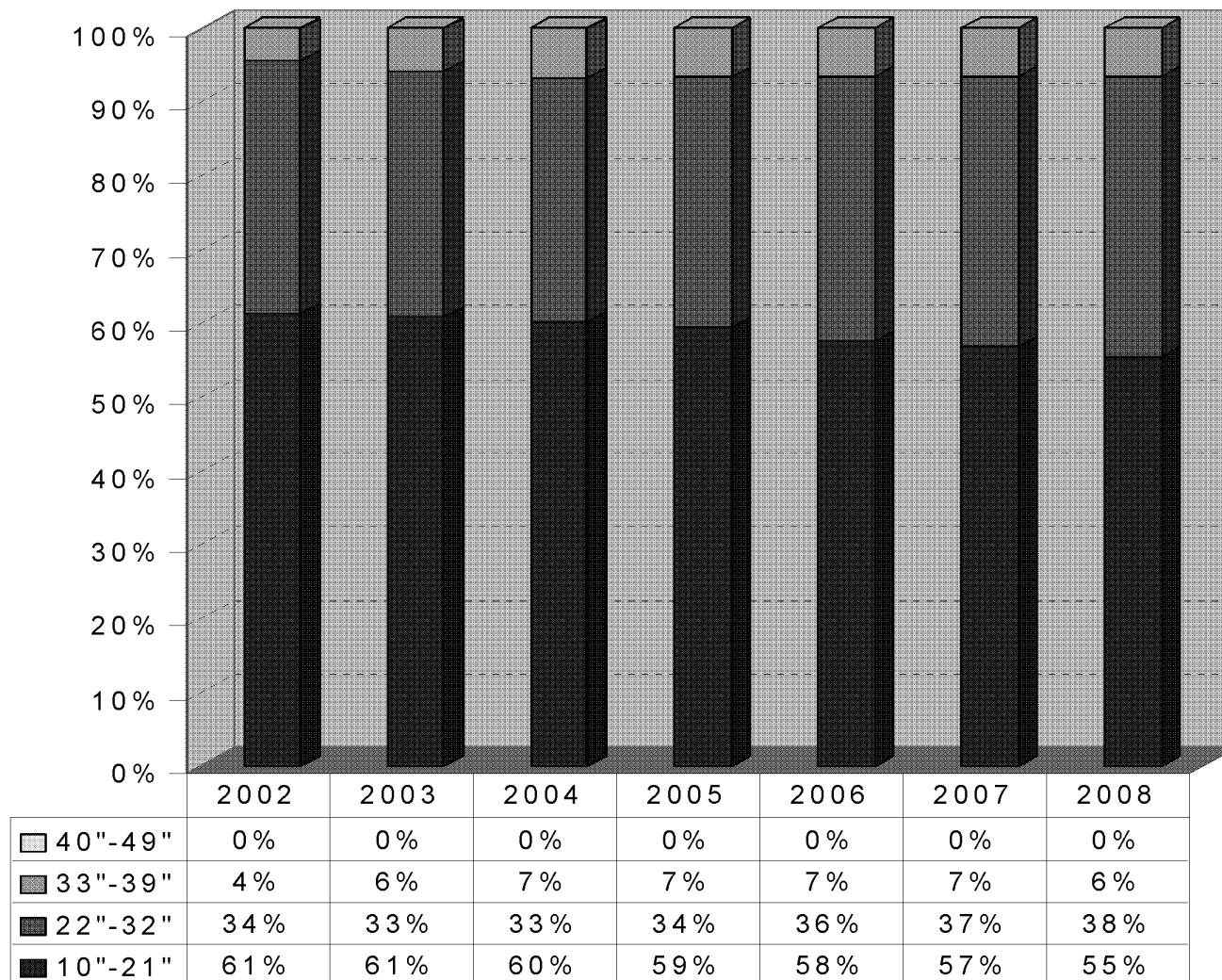
For HD1

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CRT TV Shipments by Size



- While Overall volume declines, share shifts slightly toward the larger sizes



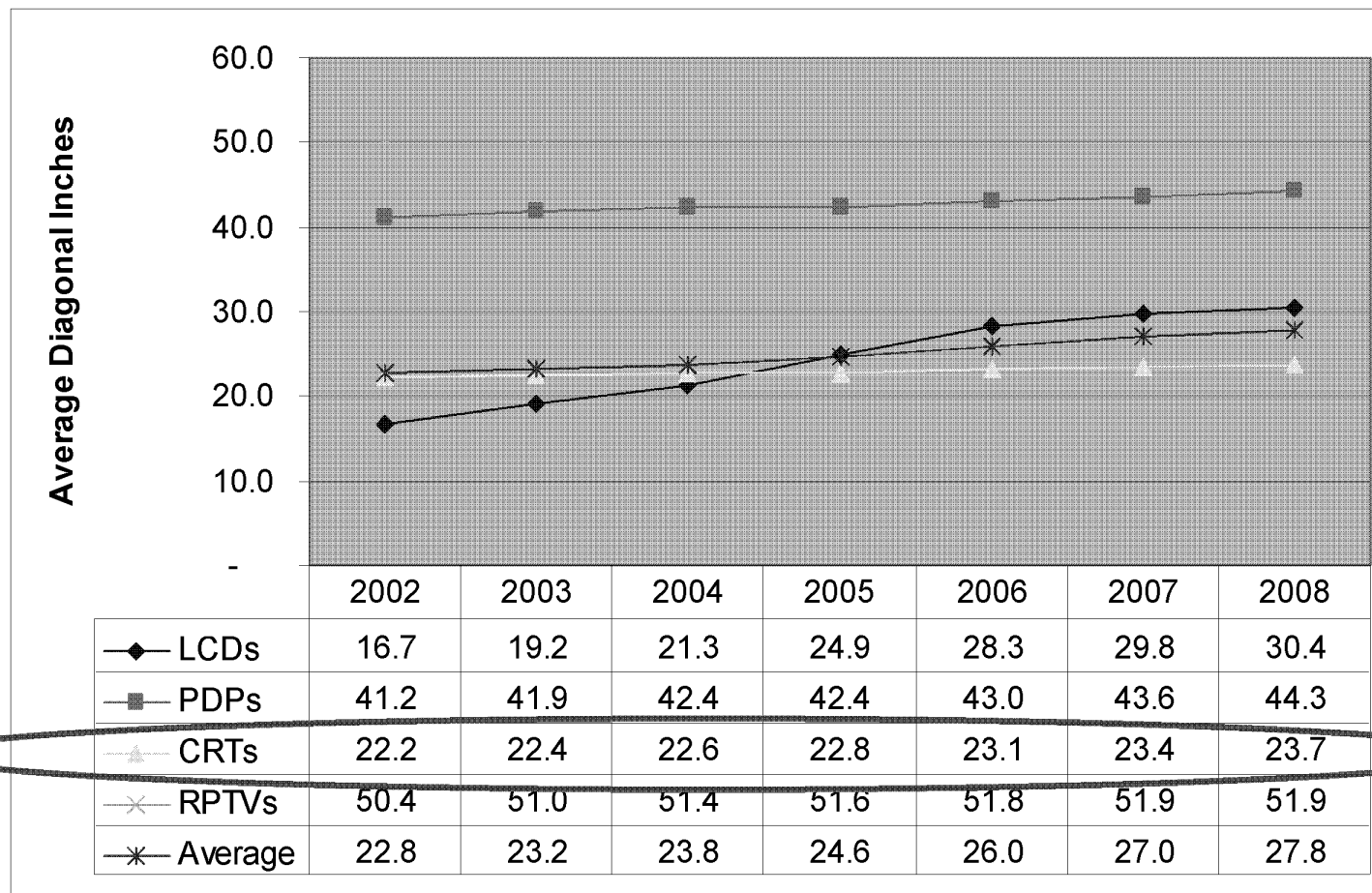
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Average TV Diagonal



- Average diagonal grows but at a slower rate than other technologies

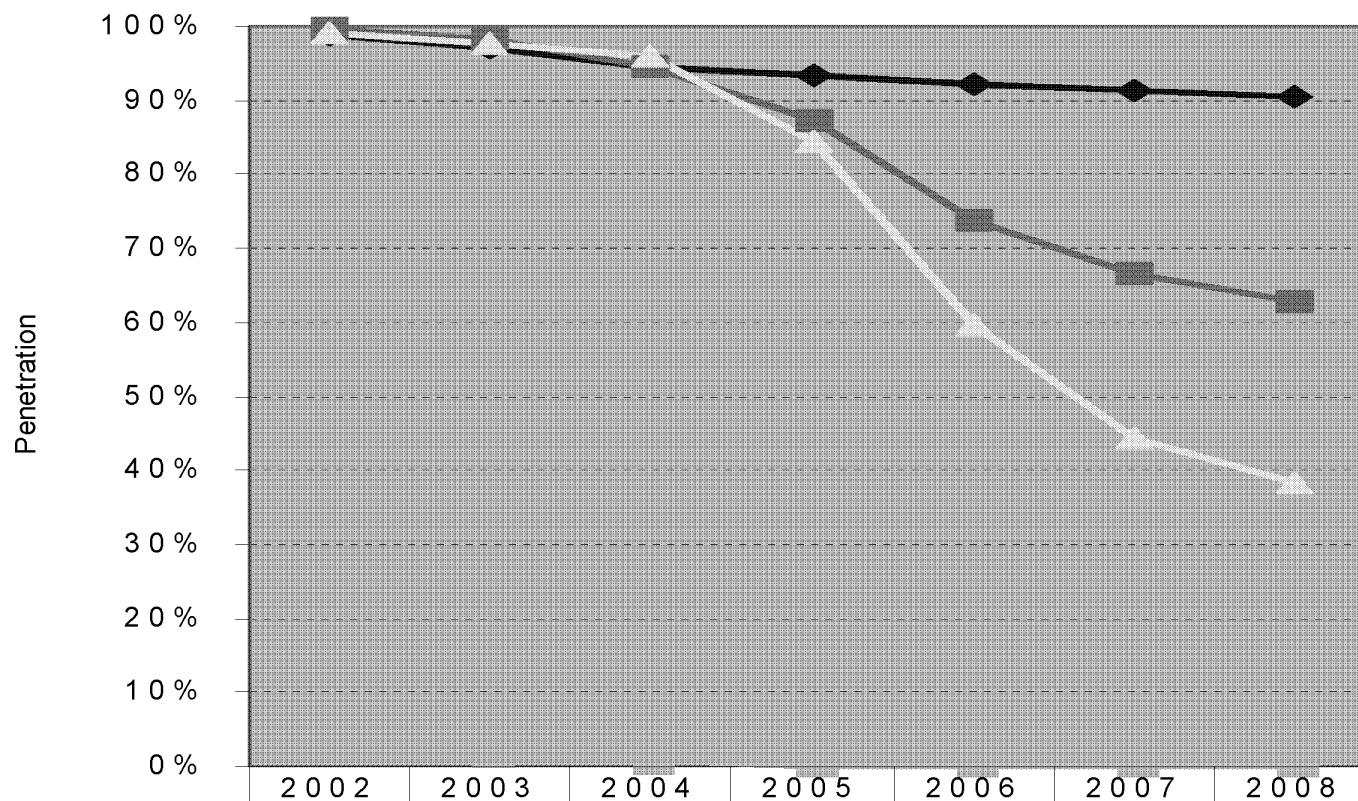


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CRT Penetration of Total TV market by Size



- CRT remains dominant in 32" and smaller sizes



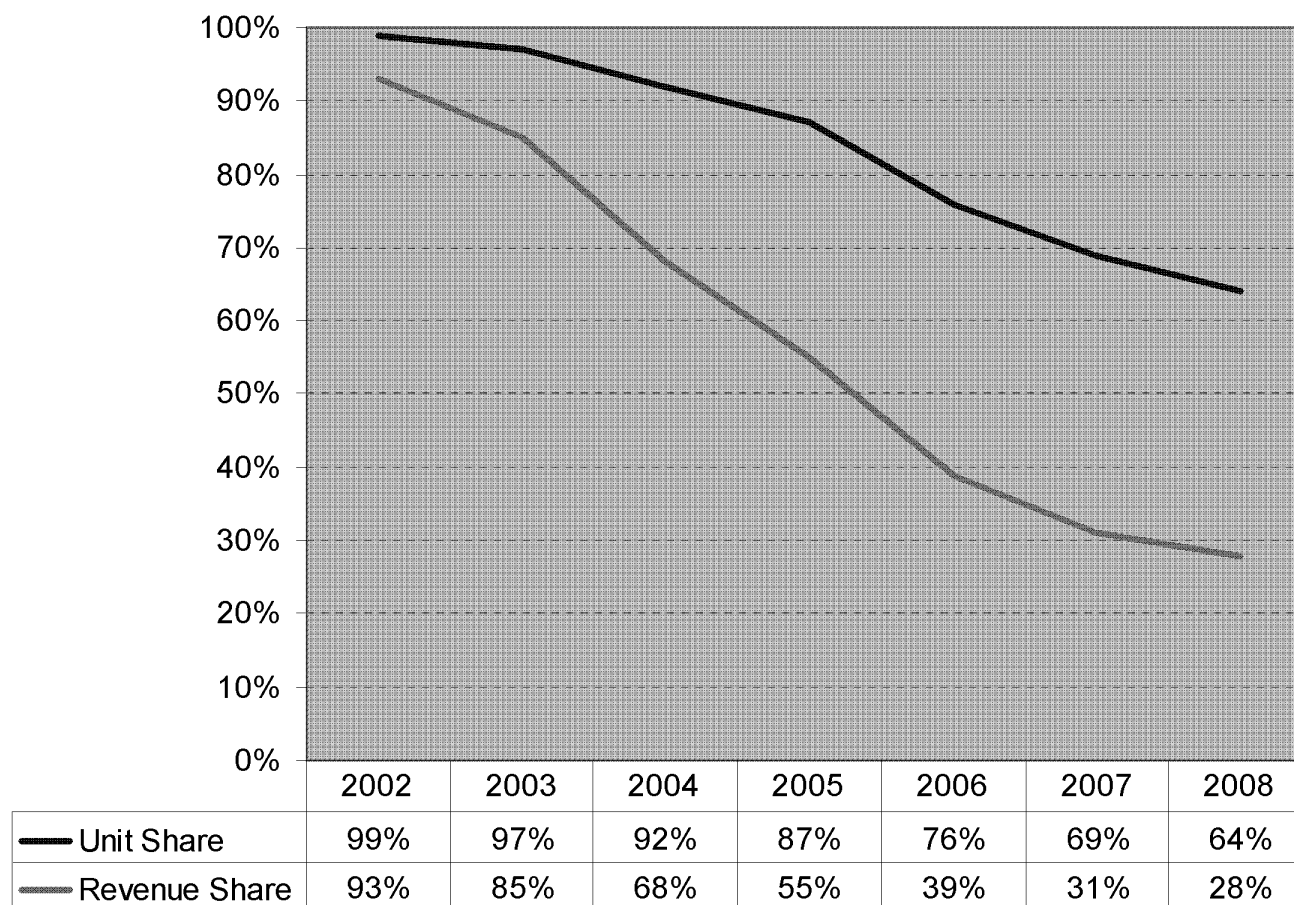
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CRT TV vs. Flat Panel* TV Share



- CRT unit share remains dominant while revenues are surpassed in 2006



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 *CRTs defined as direct view CRTs + RP CRT TVs. Flat panels defined as LCDs, PDPs, MDP TVs and MDP TVs.

CRT Outlook: Concerns



- Costs and prices are significantly higher for HD capability. 1080i CRT TV prices are 2X 480i CRTs at 27"-32".
- As LCD prices fall CRTs will lose share
- CRTs are boxy, heavy, thick and consume more power than competing technologies.
- CRT's electron beam can be influenced by magnetic fields resulting in distorted images and color.
- Consumers belief that digital/HDTVs require non-CRT solution and that the CRT forma factory is old fashioned.



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CRT Outlook: Opportunities



- Advantage of the incumbent: consumers and resellers trust CRT for long life and solid performance
- Enormous capacity base in cost effective regions
- Low cost and price advantage in a price sensitive market
- Technology of choice in rapidly growing developing countries.
- CRT TVs maintain a significant advantage in black levels and dynamic range
- New developments may improve the form factor

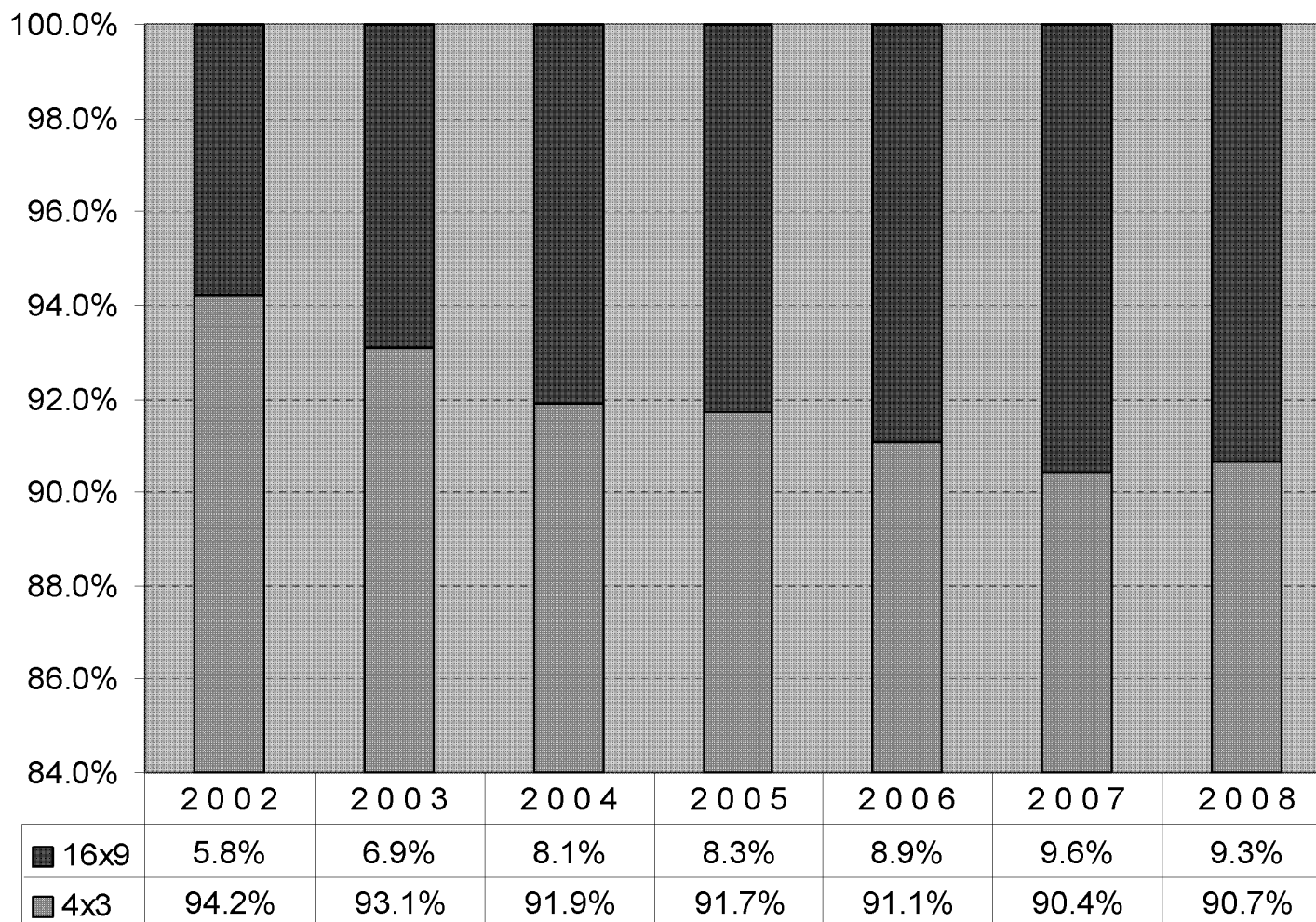


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Opportunity: Shift to Widescreen



- Widescreen grows to almost 10% share by 2008

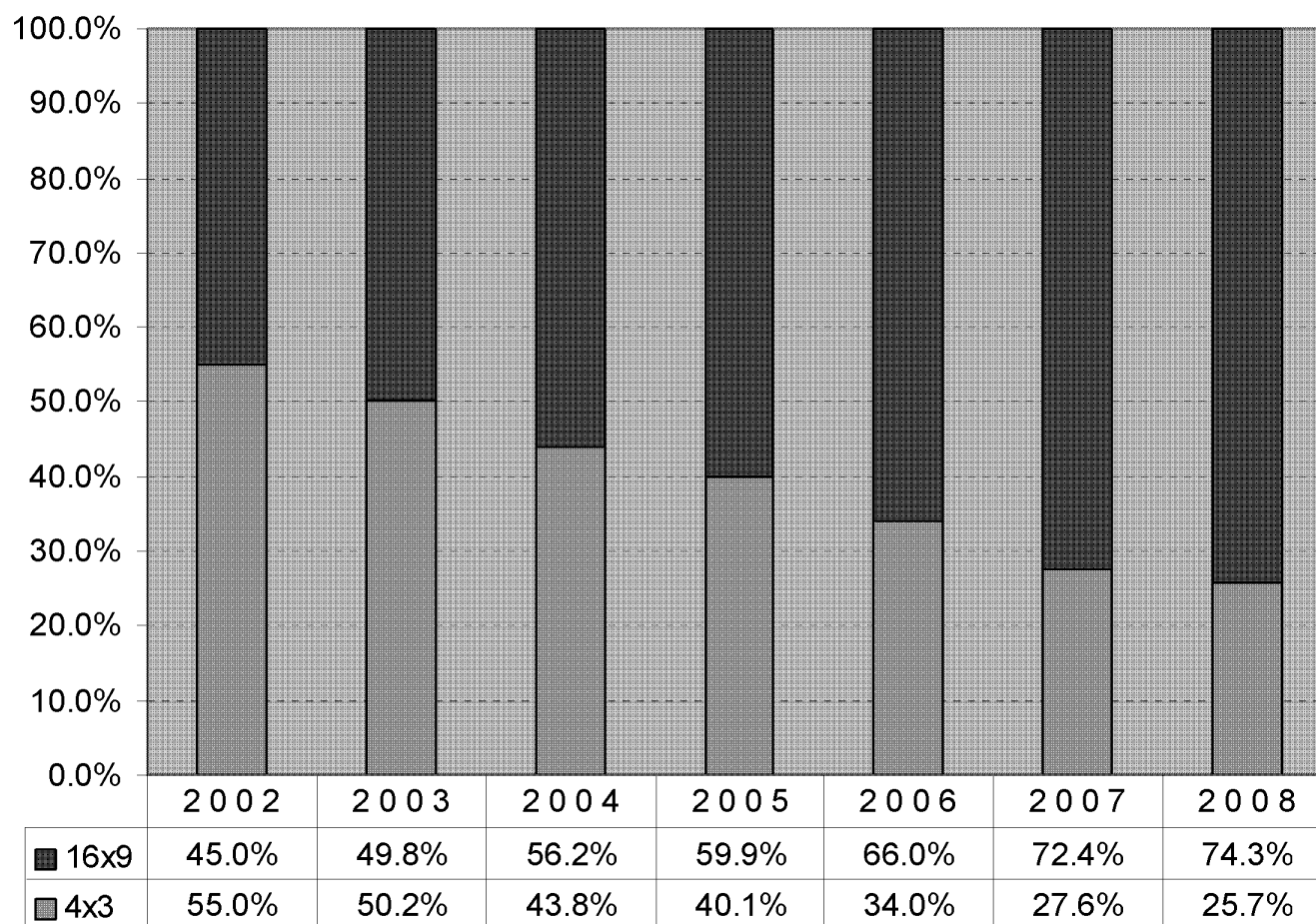


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Opportunity: Widescreen Share: 30" and Larger



- The shift to widescreen is dramatic in larger screen sizes growing to 74% by 2008



Opportunity: Great Value Relative to LCD



- Example from a recent single Circuit City ad illustrates the current value of CRT versus LCD.
- Value and performance will serve as a hedge against LCD growth in the 26-32" range.



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Opportunity: Retailers Remain Committed



- Recent Best Buy demonstrates unparalleled value.
- Ad ran is prominent space with TV circular space.
- Floor space has also been “planogrammed” for optimal location of widescreen within tube selection at most dealers.

Get a \$100 Gift Card
instantly, when you buy any Samsung digital flat tube TV and this HD upconvert player
Good toward future in-store purchase. Must be purchased on same receipt.

26" FLAT

899⁹⁸. Package

HD BUILT-IN

SAMSUNG

26" FLAT TUBE HDTV WITH DVD PLAYER
FEATURING NEAR-HD UPCONVERSION
A great price on a great combo. The TV features 3:2 pulldown for a sharper picture plus DVI inputs. The DVD player upconverts your DVDs to near-HD resolution so they look even better.
(TX-P2670WH/DVD-HD841) 6407836/6304046



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Opportunity: Improved Form Factor?



- What if a 32" CRT could outperform a flat panel TV for a similar cost and still be only 17" deep?
- In a random survey of 10 TV stands marketed as being suitable for plasma we found most were between 20-24" deep.
- Majority of plasma TVs are now used on stands, not wall-mounted



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■ Image of Samsung SDI prototype

EXHIBIT 30

Produced Natively

Table 1

U.S. PC Shipments by Quarter, 1994-2002					
	1Q	2Q	3Q	4Q	Total
1994					
Shipments (000)	4,021	4,440	4,722	5,517	18,700
Year-on-year growth (%)	17.5%	24.1%	21.5%	18.3%	20.3%
Sequential growth (%)	-13.8%	10.4%	6.4%	16.8%	
1995					
Shipments (000)	5,058	5,068	6,149	6,755	23,030
Year-on-year growth (%)	25.8%	14.1%	30.2%	22.4%	23.2%
Sequential growth (%)	-8.3%	0.2%	21.3%	9.9%	
1996					
Shipments (000)	5,792	6,041	6,974	7,673	26,480
Year-on-year growth (%)	14.5%	19.2%	13.4%	13.6%	15.0%
Sequential growth (%)	-14.3%	4.3%	15.4%	10.0%	
1997					
Shipments (000)	6,952	7,279	8,378	8,870	31,479
Year-on-year growth (%)	20.0%	20.5%	20.1%	15.6%	18.9%
Sequential growth (%)	-9.4%	4.7%	15.1%	5.9%	
1998					
Shipments (000)	7,991	8,053	9,572	10,815	36,431
Year-on-year growth (%)	15.0%	10.6%	14.2%	21.9%	15.7%
Sequential growth (%)	-9.9%	0.8%	18.9%	13.0%	
1999					
Shipments (000)	9,953	10,923	11,712	12,509	45,096
Year-on-year growth (%)	24.5%	35.6%	22.4%	15.7%	23.8%
Sequential growth (%)	-8.0%	9.7%	7.2%	6.8%	
2000					
Shipments (000)	11,594	11,426	13,089	12,297	48,406
Year-on-year growth (%)	16.5%	4.6%	11.8%	-1.7%	7.3%
Sequential growth (%)	-7.3%	-1.4%	14.6%	-6.1%	
2001					
Shipments (000)	10,638	10,173	10,421	10,259	41,491
Year-on-year growth (%)	-8.2%	-11.0%	-20.4%	-16.6%	-14.3%
Sequential growth (%)	-13.5%	-4.4%	2.4%	-1.6%	
2002					
Shipments (000)	9,283	9,934	10,751	11,071	41,038
Year-on-year growth (%)	-12.7%	-2.3%	3.2%	7.9%	-1.1%
Sequential growth (%)	-9.5%	7.0%	8.2%	3.0%	
Messages in the Data:					
The year 2001 is expected to be the worst year for the PC market in the United States					
Shipments in 2001 could decline by more than 14% assuming flat to negative single digit sequential decline in 4Q0					

Source: IDC, 3Q01

Table 2

Worldwide PC Shipments by Quarter 1994-2002					
	1Q	2Q	3Q	4Q	Total
1994					
Shipments (000)	10,356	10,798	11,364	14,507	47,025
Year-on-year growth (%)	16.7%	21.8%	20.4%	22.7%	20.6%
Sequential growth (%)	-12.4%	4.3%	5.2%	27.7%	
1995					
Shipments (000)	13,278	13,287	14,602	18,295	59,462
Year-on-year growth (%)	28.2%	23.1%	28.5%	26.1%	26.4%
Sequential growth (%)	-8.5%	0.1%	9.9%	25.3%	
1996					
Shipments (000)	16,047	16,055	17,163	20,981	70,245
Year-on-year growth (%)	20.9%	20.8%	17.5%	14.7%	18.1%
Sequential growth (%)	-12.3%	0.0%	6.9%	22.2%	
1997					
Shipments (000)	18,654	18,863	19,967	23,950	81,433

Year-on-year growth (%)	16.2%	17.5%	16.3%	14.2%	15.9%
Sequential growth (%)	-11.1%	1.1%	5.9%	20.0%	
1998					
Shipments (000)	20,903	20,444	22,613	27,967	91,926
Year-on-year growth (%)	12.1%	8.4%	13.3%	16.8%	12.9%
Sequential growth (%)	-12.7%	-2.2%	10.6%	23.7%	
1999					
Shipments (000)	25,410	26,387	28,409	33,744	113,950
Year-on-year growth (%)	21.6%	29.1%	25.6%	20.7%	24.0%
Sequential growth (%)	-9.1%	3.8%	7.7%	18.8%	
2000					
Shipments (000)	31,006	30,532	33,822	36,686	132,046
Year-on-year growth (%)	22.0%	15.7%	19.1%	8.7%	15.9%
Sequential growth (%)	-8.1%	-1.5%	10.8%	8.5%	
2001					
Shipments (000)	32,166	29,384	29,284	33,068	123,903
Year-on-year growth (%)	3.7%	-3.8%	-13.4%	-9.9%	-6.2%
Sequential growth (%)	-12.3%	-8.6%	-0.3%	12.9%	
2002					
Shipments (000)	29,490	29,249	31,345	36,389	126,472
Year-on-year growth (%)	-8.3%	-0.5%	7.0%	10.0%	2.1%
Sequential growth (%)	-10.8%	-0.8%	7.2%	16.1%	
Messages in the Data:					
Worldwide PC shipments witnessed their second consecutive year-on-year decline in 3Q01					
Worldwide shipments for 2001 are expected to decline by about 6%					

Source: IDC, 3Q01

Table 3

Worldwide and U.S. PC Revenue by Vendor, 3Q00, 2Q01, and 3Q01

	Worldwide					U.S.				
	3Q01 Revenue (\$M)	3Q00 Revenue (\$M)	Year-on-Year Growth (%)	2Q01 Revenue (\$M)	Sequential Growth (%)	3Q01 Revenue (\$M)	3Q00 Revenue (\$M)	Year-on-Year Growth (%)	2Q01 Revenue (\$M)	Sequential Growth (%)
Apple	1,450	1,769	-18.0%	1,479	(2.0%)	908	1,047	-13.3%	821	10.6%
Compaq	7,500	11,200	-33.0%	8,453	(11.3%)	3,295	5,403	-39.0%	3,575	(7.8%)
Dell	7,470	8,264	-9.6%	8,028	(7.0%)	5,229	5,501	-4.9%	5,003	4.5%
Gateway	1,400	2,527	-44.6%	1,500	(6.7%)	1,274	2,151	-40.8%	1,236	3.1%
Hewlett-Packard	3,916	5,130	-23.7%	3,956	(1.0%)					
IBM	3,120	4,395	-29.0%	3,400	(8.2%)	942	1,328	-29.1%	1,003	(6.1%)
Totals	24,856	33,285	-25.3%	26,816	(7.3%)	11,648	15,430	-24.5%	11,638	0.1%

Notes:

Revenue is total corporate revenue, except for IBM and HP

Dell's fiscal 1Q02 ended May 4, 2001.

HP's fiscal 2Q01 ended July 30, 2001.

Apple's fiscal 3Q01 ended June 30, 2001.

Source: IDC, 3Q01

Table 4

Worldwide Gross and Operating Margins by Vendor, 3Q00, 2Q01, and 3Q01

	Gross Margin (%)			Operating Margin (%)		
	3Q01	3Q00	2Q01	3Q01	3Q00	2Q01
Apple	30.1%	28.7%	29.4%	4.0%	4.5%	3.5%
Compaq	19.9%	23.9%	21.5%	(0.8%)	7.0%	1.0%
Dell	18.0%	21.3%	18.0%	7.3%	9.9%	4.2%
Gateway	16.8%	23.1%	18.7%	(7.0%)	8.7%	(27.0%)
Hewlett-Packard	25.7%	28.5%	26.0%	(4.7%)	4.0%	(3.8%)
IBM	24.0%	27.9%	29.9%	12.6%	12.9%	12.3%
Weighted average	20.5%	24.1%	21.9%	3.7%	8.6%	2.0%

Notes

IBM gross margins are for all hardware sales, not just PCs; operating margins are for total company.

HP gross margins are for the entire company. Operating margins for computing systems segment only.

Gross and operating margins for other vendors are for all sales.

Weighted average excludes IBM.

Source: IDC, 3Q01

Table 5

U.S. PC Shipments by Top 10 Vendors, 3Q01, 2Q01, and 3Q00									
3Q01 Rank	Vendor	3Q01		3Q00		Year-on-Year Growth (%)	2Q01		Sequential Growth (%)
		Shipments (000)	Share (%)	Shipments (000)	Share (%)		Shipments (000)	Share (%)	
1	Dell	2,731	26.2%	2,578	19.7%	5.9%	2,526	24.8%	8.2%
2	Compaq	1,368	13.1%	2,258	17.3%	-39.4%	1,304	12.8%	5.0%
3	Hewlett-Pack	962	9.2%	1,442	11.0%	-33.3%	989	9.7%	-2.8%
4	Gateway	817	7.8%	1,188	9.1%	-31.2%	798	7.8%	2.5%
5	IBM	689	6.6%	739	5.6%	-6.8%	632	6.2%	9.1%
6	Apple	480	4.6%	613	4.7%	-21.7%	453	4.5%	6.0%
7	eMachines	244	2.3%	407	3.1%	-40.0%	266	2.6%	-8.3%
8	Toshiba	232	2.2%	316	2.4%	-26.4%	232	2.3%	0.1%
9	Acer	215	2.1%	281	2.2%	-26.1%	231	2.3%	-6.8%
10	Sony	213	2.0%	207	1.6%	-3.0%	199	2.0%	7.2%
	Other	2,468	23.7%	3,050	23.3%	-19.1%	2,545	25.0%	-3.0%
	All vendors	10,421	100.0%	13,089	100.0%	-20.4%	10,173	100.0%	2.4%

Key Assumptions:
Shipments are branded shipments and exclude OEM sales for all vendors
Data for all vendors are reported for calendar periods

Messages in the Data:
Dell increased substantially its market share gap thanks to a strong consumer market
Compaq made market share gains sequentially but its position deteriorated on the year-on-year basis
In spite of a relatively good consumer quarter, HP reported a sequential decline, unlike most of the top-10
With the exception of Dell and Sony, all top-10 vendors witnessed year-on-year declines
Source: IDC, 3Q01

Table 6

Worldwide PC Shipments by Top 10 Vendors, 3Q01, 2Q01, and 3Q00									
3Q01 Rank	Vendor	3Q01		3Q00		Year-on-Year Growth (%)	2Q01		Sequential Growth (%)
		Shipments (000)	Share (%)	Shipments (000)	Share (%)		Shipments (000)	Share (%)	
1	Dell	4,236	14.5%	3,870	11.4%	9.5%	3,983	13.6%	6.3%
2	Compaq	3,290	11.2%	4,690	13.9%	-29.8%	3,523	12.0%	-6.6%
3	IBM	2,010	6.9%	2,454	7.3%	-18.1%	2,148	7.3%	-6.4%
4	Hewlett-Pack	2,008	6.9%	2,620	7.7%	-23.4%	2,078	7.1%	-3.4%
5	Fujitsu Siemens	1,285	4.4%	1,623	4.8%	-20.8%	1,311	4.5%	-2.0%
6	NEC	939	3.2%	1,381	4.1%	-32.0%	1,058	3.6%	-11.2%
7	Toshiba	932	3.2%	1,061	3.1%	-12.1%	885	3.0%	5.3%
8	Gateway	877	3.0%	1,393	4.1%	-37.0%	921	3.1%	-4.9%
9	Apple	858	2.9%	1,123	3.3%	-23.6%	833	2.8%	3.0%
10	Acer	849	2.9%	970	2.9%	-12.5%	833	2.8%	2.0%
	Other	12,000	41.0%	12,638	37.4%	-5.0%	11,812	40.2%	1.6%
	All vendors	29,284	100.0%	33,822	100.0%	-13.4%	29,384	100.0%	-0.3%

Key Assumptions:
Shipments are branded shipments and exclude OEM sales for all vendors
Data for all vendors are reported for calendar periods

Messages in the Data:
Dell was the only vendor to report a year-on-year growth increase in 3Q01
All other vendors reported double digit shipment declines in 3Q01 compared with 3Q00
White box players ended the quarter above average market growth, albeit negative
Source: IDC, 3Q01

Table 7

U.S. Desktop PC Shipments by Top 10 Vendors, 3Q01, 2Q01, and 3Q00									
3Q01 Rank	Vendor	3Q01		3Q00		Year-on-Year Growth (%)	2Q01		Sequential Growth (%)
		Shipments (000)	Share (%)	Shipments (000)	Share (%)		Shipments (000)	Share (%)	
1	Dell	1,997	26.4%	1,971	19.8%	1.3%	1,857	24.7%	7.6%
2	Compaq	995	13.2%	1,685	16.9%	-40.9%	959	12.7%	3.7%

3	Hewlett-Pack	784	10.4%	1,267	12.7%	-38.1%	809	10.8%	-3.2%
4	Gateway	676	8.9%	1,051	10.6%	-35.7%	676	9.0%	0.0%
5	IBM	345	4.6%	360	3.6%	-4.1%	348	4.6%	-0.8%
6	Apple	316	4.2%	516	5.2%	-38.7%	306	4.1%	3.2%
7	eMachines	244	3.2%	407	4.1%	-40.0%	266	3.5%	-8.3%
8	Acer	179	2.4%	240	2.4%	-25.5%	194	2.6%	-7.7%
9	Sony	73	1.0%	54	0.5%	36.1%	74	1.0%	-1.0%
10	Micron	53	0.7%	175	1.8%	-69.7%	67	0.9%	-20.8%
	Other	1,899	25.1%	2,216	22.3%	-14.3%	1,973	26.2%	-3.7%
All vendors		7,561	100.0%	9,942	100.0%	-23.9%	7,529	100.0%	0.4%

Key Assumptions:

Shipments are branded shipments and exclude OEM sales for all vendors
Data for all vendors are reported for calendar periods

Messages in the Data:

The top 10 rankings for 3Q01 remained unchanged from previous quarter
Top vendor Dell reported flat growth sequentially, other vendors witnessed double digit declines (excluding IBM)
Source: IDC, 3Q01

Table 8

Worldwide Desktop PC Shipments by Top 10 Vendors, 3Q01, 2Q01, and 3Q00

3Q01 Rank	Vendor	3Q01		3Q00		Year-on-Year Growth (%)	2Q01		Sequential Growth (%)
		Shipments (000)	Share (%)	Shipments (000)	Share (%)		Shipments (000)	Share (%)	
1	Dell	3,086	14.1%	2,933	11.3%	5.2%	2,884	13.2%	7.0%
2	Compaq	2,417	11.1%	3,516	13.5%	-31.3%	2,567	11.7%	-5.8%
3	Hewlett-Pack	1,594	7.3%	2,259	8.7%	-29.4%	1,673	7.6%	-4.7%
4	IBM	1,145	5.2%	1,497	5.8%	-23.5%	1,297	5.9%	-11.7%
5	Fujitsu Siemens	869	4.0%	1,130	4.3%	-23.1%	860	3.9%	1.0%
6	Gateway	717	3.3%	1,220	4.7%	-41.3%	774	3.5%	-7.4%
7	Legend	676	3.1%	583	2.2%	16.0%	586	2.7%	15.4%
8	NEC	603	2.8%	918	3.5%	-34.3%	632	2.9%	-4.6%
9	Apple	565	2.6%	952	3.7%	-40.6%	585	2.7%	-3.5%
10	Acer	552	2.5%	680	2.6%	-18.8%	549	2.5%	0.4%
	Other	9,605	44.0%	10,343	39.7%	-7.1%	9,472	43.3%	1.4%
All vendors		21,828	100.0%	26,030	100.0%	-16.1%	21,879	100.0%	-0.2%

Key Assumptions:

Shipments are branded shipments and exclude OEM sales for all vendors
Data for all vendors are reported for calendar periods

Messages in the Data:

Worldwide desktop shipments fell 16% year on year and were flat sequentially
Dell consolidated its top position with a market share exceeding 14%, thanks to above market growth rates
Source: IDC, 3Q01

Table 9

U.S. Portable PC Shipments by Top 10 Vendors, 3Q01, 2Q01, and 3Q00

3Q01 Rank	Vendor	3Q01		3Q00		Year-on-Year Growth (%)	2Q01		Sequential Growth (%)
		Shipments (000)	Share (%)	Shipments (000)	Share (%)		Shipments (000)	Share (%)	
1	Dell	633	25.2%	518	18.9%	22.1%	571	24.7%	10.9%
2	IBM	313	12.5%	335	12.2%	-6.6%	254	11.0%	23.0%
3	Compaq	274	10.9%	455	16.6%	-39.8%	250	10.8%	9.8%
4	Toshiba	227	9.0%	304	11.1%	-25.5%	222	9.6%	2.3%
5	Hewlett-Pack	163	6.5%	146	5.3%	11.3%	158	6.8%	3.1%
6	Apple	163	6.5%	95	3.5%	70.5%	145	6.3%	12.0%
7	Sony	140	5.6%	153	5.6%	-8.6%	125	5.4%	12.0%
8	Gateway	134	5.4%	128	4.7%	4.9%	115	5.0%	16.8%
9	Acer	33	1.3%	46	1.7%	-27.6%	34	1.5%	-1.7%
10	NEC	31	1.2%	39	1.4%	-19.9%	29	1.2%	9.0%
	Other	398	15.9%	516	18.9%	-22.9%	405	17.5%	-1.6%
All vendors		2,508	100.0%	2,736	100.0%	-8.3%	2,306	100.0%	8.8%

Key Assumptions:

Shipments are branded shipments and exclude OEM sales for all vendors
Data for all vendors are reported for calendar periods

Messages in the Data:

Portable PC shipments grew nearly 9% sequentially in 3Q01 but fell by 8% year on year
 All top-10 vendors reported sequential growth rates
 Apple recorded the strongest year-on-year growth thanks to strong demand for iBooks in education
 Source: IDC, 3Q01

Table 10

Worldwide Portable PC Shipments by Top 10 Vendors, 3Q01, 2Q01, and 3Q00

3Q01 Rank	Vendor	3Q01		3Q00		Year-on-Year Growth (%)	2Q01		Sequential Growth (%)
		Shipments (000)	Share (%)	Shipments (000)	Share (%)		Shipments (000)	Share (%)	
1	Dell	969	14.8%	791	11.6%	22.6%	927	14.0%	4.6%
2	Toshiba	852	13.0%	942	13.8%	-9.5%	812	12.3%	4.9%
3	IBM	747	11.4%	823	12.0%	-9.3%	738	11.2%	1.2%
4	Compaq	636	9.7%	905	13.2%	-29.8%	708	10.7%	-10.2%
5	Sony	385	5.9%	377	5.5%	2.1%	437	6.6%	-11.8%
6	Fujitsu Siemens	380	5.8%	457	6.7%	-16.8%	421	6.4%	-9.7%
7	Hewlett-Packard	331	5.1%	266	3.9%	24.4%	318	4.8%	4.3%
8	NEC	311	4.7%	440	6.4%	-29.4%	404	6.1%	-23.0%
9	Apple	290	4.4%	166	2.4%	74.1%	245	3.7%	18.3%
10	Acer	280	4.3%	271	4.0%	3.5%	265	4.0%	5.7%
	Other	1,364	20.8%	1,395	20.4%	-2.3%	1,342	20.3%	1.6%
	All vendors	6,544	100.0%	6,833	100.0%	-4.2%	6,616	100.0%	-1.1%

Key Assumptions:

Shipments are branded shipments and exclude OEM sales for all vendors
 Data for all vendors are reported for calendar periods

Messages in the Data:

The worldwide portable PC market suffered in 3Q01 with declining shipments both on the year-on-year and sequential basis
 Dell grew its market share to 14.8% thanks to a strong year-on-year growth rate of 22.6%
 Toshiba lost 0.8 percentage point market share to 13%
 Source: IDC, 3Q01

Table 11

Star Rating System for the Top 10 U.S. Desktop and Portable PC Vendors, 3Q01

Vendor	Form Factor	Product Specific		Market Specific		Company Specific			Total	3Q01 Stars
		Product Breadth	Channels	Brand Image	Overall U.S.		Execution Skills			
					Market Share	Momentum				
Acer	Desktop	3.0	2.0	1.5	1.5	1.0	1.0	1.67		
	Portables	3.5	2.0	1.5	1.5	2.0	1.0	1.92		
Apple	Desktop	4.5	4.0	5.0	3.0	4.0	4.5	4.17		
	Portables	3.5	4.0	5.0	3.0	4.5	5.0	4.17		
Compaq	Desktop	5.0	4.5	3.0	3.5	2.0	3.0	3.50		
	Portables	4.5	3.5	3.0	4.0	3.5	2.5	3.50		
Dell	Desktop	4.5	4.0	4.5	5.0	4.5	5.0	4.58		
	Portables	5.0	4.0	4.5	5.0	5.0	5.0	4.75		
Gateway	Desktop	4.5	4.5	4.0	3.5	4.0	4.0	4.08		
	Portables	4.5	4.0	3.0	4.0	4.5	4.0	4.00		
Hewlett-Packard	Desktop	4.5	4.5	4.5	3.5	4.5	4.5	4.33		
	Portables	4.5	4.5	3.5	4.0	4.5	4.5	4.25		
IBM	Desktop	4.5	3.5	3.5	2.5	3.0	3.0	3.33		
	Portables	4.5	3.5	5.0	4.5	4.0	4.5	4.33		
Micron	Desktop	3.0	2.5	2.0	1.0	1.5	3.0	2.17		
NEC	Portables	3.5	3.0	3.0	2.0	2.0	2.5	2.67		
Sony	Desktop	3.5	3.0	2.5	2.5	2.5	2.5	2.75		
	Portables	5.0	4.5	5.0	3.0	4.5	4.5	4.42		
Toshiba	Portables	5.0	4.5	4.5	4.0	3.0	2.5	3.92		
eMachines	Desktop	3.0	2.5	2.0	3.0	2.5	3.0	2.67		

Definitions:

5 stars, score of 4.5–5.0; 4.5 stars, score of 4.30–4.49; 4 stars, score of 4.0–4.29; 3.5 stars, score of 3.80–3.99; 3 stars, score of 3.4–3.79; 2.5 stars, score of 3.20–3.39; 2 stars, score of 2.5–3.19; 1.5 stars, score of 2.30–2.49; 1 star, score of 2.0–2.29; 1/2 star, score of 1.99 or below.

Source: IDC, 3Q01

Table 12

U.S. Desktop and Portable PC Performance Factors by Top 10 Vendors, 3Q01

Vendor	Form Factor	Performance Factors
Acer	Desktops	Acer showed similar year-on-year growth to the Total US market and appears to be relatively stable, compared to the total market.
	Portables	Acer's history of focussing on biometric and smart card technologies are beginning to pay off, keeping the company in the U.S. top ten. However, Acer's product line needs a refreshed industrial design.
Apple	Desktops	Apple introduced impressive new high-end desktop G4 systems while introducing price cuts to its iMac line. The company showed impressive momentum moving forward, and its retail initiative continues to grow.
	Portables	Apple's portable business continued to outperform the U.S. market's average as competitors scramble to catch up with the company's strong momentum. While the PowerBook began to see sales tail off in this quarter, the iBook, however, found tremendous success in the education and consumer segments during the back-to-school season.
Compaq	Desktops	Compaq continued to struggle with its brand image in light of the proposed merger with Hewlett-Packard. The company lost significant market share year-on-year, and shows no signs of any change in momentum.
	Portables	Compaq's Evo product line is almost completely filled out with the addition of the N600, but traction in the commercial space has not yet been fully accomplished. Competition with Dell, HP, and Toshiba in the consumer segment continued to erode the company's margins. The uncertainty created by the proposed HP merger has inhibited the company's ability to gain new customers in both the consumer and commercial segments.
Dell	Desktops	Dell continued its assault on other Wintel players with continued price cuts, taking advantage of its lower cost structure. The company introduced a low-end desktop which added to its product breadth, but suffered from reports of customer service difficulties and delays.
	Portables	The company focussed on aggressive pricing tactics rather than make any dramatic changes to its product line. Dell continued to push aggressively into the education space, challenging Apple for dominance.
eMachines	Desktops	eMachines struggled in the third quarter, losing market share and suffering from significant price competition in the retail space. Nonetheless, as a major supplier to the retail sector, the company stands to gain from the consolidation of HP and Compaq.
Gateway	Desktops	Gateway's third quarter was mired by corporate reorganization and the company's attempt to exit the foreign markets. Still, the company seems to be in a restructuring mode, after ending worldwide operations and significant domestic layoffs.
	Portables	Gateway found some success in the consumer segment via total-solution packages and partnerships with broadband providers. Entry-level consumer notebook refreshes were well-timed for the back-to-school shopping season.
Hewlett-Packard	Desktops	HP's shipments fell both year-on-year and sequentially, resulting in lost market share. However, the company's brand is untarnished as HP is viewed as the acquirer in the proposed merger with Compaq.
	Portables	HP's third quarter focussed on aggressively pursuing commercial contracts and supply chain management. Wireless integration across all commercial notebooks continued, and the company found success in high-end consumer shipments.
IBM	Desktops	IBM announced a new line of desktops, MAX, which feature the ability to manage hard drive images across the entire product line. The company's emphasis on business PCs may not help its total market share, but is targeted at customers more likely to bring it profitable business.
	Portables	IBM's third quarter focussed on the reorganization of the company's PC division to better integrate the sales, support, procurement, services, and product development teams. Nevertheless, the company began to roll out its refreshed portable line with integrated wireless and embedded security chips.
Micron	Desktops	Micron's association with AMD on home systems helped the company build momentum in the third quarter. The company also expanded its sales into the channel, despite roots as a pure direct business.
Sony	Desktops	Sony has doubled its small desktop PC market share in the past year, while introducing an impressive breadth of high-end products. The company seems poised to sell only high-margin, high-performance PCs to lucrative power users.
	Portables	Sony continued to be the only ultraportable OEM to find any level of success in the one-spindle market place with its PictureBook. The company upgraded its customer support and services offering, as well as introduced the new commercial focussed GR notebook, in order to focus on the SMB market.
Toshiba	Portables	Toshiba began to refresh its commercial portable offerings with revamped Portege and Tecra products. Toshiba continued to lead the way in wireless integration by incorporating both 802.11b and Bluetooth into its new products.

Table 13

Worldwide Desktop and Portable PC Shipments by Region, 3Q01, 2Q01, and 3Q00

Region	Form Factor	3Q01	3Q00	Year-on-Year Growth (%)	2Q01	Sequential Growth (%)
Asia/Pacific	Desktop	4,525,451	4,605,812	-1.7%	4,397,109	2.9%
	Portables	693,542	605,785	14.5%	667,838	3.8%
	All clients	5,218,993	5,211,597	0.1%	5,064,947	3.0%
Japan	Desktop	1,348,138	1,889,380	-28.6%	1,519,707	-11.3%
	Portables	1,322,814	1,505,900	-12.2%	1,718,666	-23.0%
	All clients	2,670,952	3,395,280	-21.3%	3,238,373	-17.5%
ROW	Desktop	4,062,604	4,355,602	-6.7%	3,772,241	7.7%

	Portables	528,430	490,376	7.8%	456,006	15.9%
	All clients	4,591,034	4,845,978	-5.3%	4,228,247	8.6%
United States	Desktop	7,561,357	9,941,796	-23.9%	7,528,888	0.4%
	Portables	2,507,795	2,735,858	-8.3%	2,305,875	8.8%
W. Europe	All clients	10,069,152	12,677,654	-20.6%	9,834,763	2.4%
	Desktop	4,330,736	5,237,289	-17.3%	4,661,350	-7.1%
	Portables	1,491,743	1,494,852	-0.2%	1,467,228	1.7%
	All clients	5,822,479	6,732,141	-13.5%	6,128,578	-5.0%
Worldwide	Desktop	21,828,286	26,029,879	-16.1%	21,879,295	-0.2%
	Portables	6,544,324	6,832,771	-4.2%	6,615,613	-1.1%
	All clients	28,372,610	32,862,650	-13.7%	28,494,908	-0.4%

Note: The "All Clients" view shown in this table differs from the "All PCs" view used elsewhere in this document in that the All PCs view includes PC servers.

Messages in the Data:

All regions witnessed year-on-year declines with the exception of a flat growth for Asia Pacific

ROW witnessed the strongest sequential gain

Source: IDC, 3Q01

Table 14
New Technologies Debating During 3Q01

Technology	Product Type	Target Segment	Significance	Comments
Desktops				
900MHz Intel Celeron processor	Mainstream desktops	Value buyers	Low	Intel continues its price and speed competition with AMD with this announcement.
1.6 and 1.8GHz Intel Pentium 4 processor	Performance desktops	Performance buyers	Low	Setting the stage for its 2GHz launch later in the quarter, the company introduces processors which will become standard in performance desktop shipments in a matter of months.
700MHz Apple G3 processor	Mainstream desktops	Value buyers	Medium	Apple's iMac maintains its dated form factor for one more cycle as the company bumps the processor speed of the entry level Mac.
867 and dual 800MHz Apple G4 processor	Performance desktops	Prestige buyers	High	Apple uses its MacWorld address to show that an 867MHz G4 can compete with Intel's best-in-class 1.8GHz processor.
1GHz AMD Duron processor	Mainstream desktops	Value buyers	Medium	AMD beats Intel to the 1GHz value punch with its Duron announcement.
2GHz Intel Pentium 4 processor	Performance desktops	Prestige buyers	Medium	Intel's introduction of the 2GHz P4 is a significant psychological milestone which forces the industry to move to higher speeds.
950MHz, 1 and 1.1GHz Intel Celeron processor	Mainstream desktops	Value buyers	Medium	Intel's Celeron surpasses AMD's Duron and helps the company spread the message that megahertz matters.
Intel 845 Chipset	Mainstream desktops	Business buyers	High	The Intel 845 Chipset represents a major piece in Intel's plan to see the Pentium 4 inside the mainstream PC platforms.
Portables				
1.13MHz to 866MHz Intel PIII-M processor	Performance two- and three-spindle	Performance & Mobile Pro	High	Combination of 0.13 micron technology, Enhanced Speedstep, and 512K of L2 cache put significant pressure on AMD and Transmeta.
1.1GHz Mobile AMD Athlon 4	Performance three-spindle	Performance Consumer	Medium	Produced with 0.18 micron technology, 256K cache, 200MHz front side bus and new X86 instruction sets. Tries to catch up with Intel's PIII-M offering, but the company needs to move to 0.13 as s
ATI Mobility Radeon 7500	Performance	Consumer	Low	Focuses on the power notebook user and continues to apply pressure on NVIDIA.
Intel 830MP Chipset	Performance	Performance	Medium	First mobile chipset that supports Intel's hub architecture, demotes PCI bus to an I/O bus and Connects AGP4X graphics bus to a discrete controller.

Source: IDC, 3Q01

Table 15
U.S. PC Shipments by Form Factor, A535 - 4Q01, 3Q01, and 4Q00

Form Factor	Shipments (000)			Year-on-Year Growth (%)	Sequential Growth (%)
	4Q01	4Q00	3Q01		
Desktop	7,338	9,475	7,561	-22.8%	-3.0%
Portables	2,523	2,416	2,508	4.4%	0.6%
All clients	9,861	11,891	10,069	-17.1%	-2.1%

Notes:

4Q01 data is forecast.

The "All Clients" view shown in this table differs from the "All PCs" view used elsewhere in this document. The All PCs view includes PC servers.

Messages in the Data:

Portables growth will exceed desktop growth year on year and sequentially.

Source: IDC, 3Q01

Table 16
Worldwide PC Shipments by Form Factor, 4Q01, 3Q01, and 4Q00

Shipments (000)

Form Factor	4Q01	4Q00	3Q01	Year-on-Year Growth (%)	Sequential Growth (%)
Desktop	24,939	28,631	21,828	-12.9%	14.2%
Portables	7,109	7,030	6,544	1.1%	8.6%
All clients	32,048	35,661	28,373	-10.1%	13.0%

Notes:

4Q01 data is forecast.

The "All Clients" view shown in this table differs from the "All PCs" view used elsewhere in this document. The All PCs view includes PC servers.

Messages in the Data:

Portables growth will exceed desktop growth year on year

Desktop growth will exceed portable PC growth rate on the sequential basis

Source: IDC, 3Q01

Table 17
Desktop and Portable PC Technology Outlook, 4Q01

Technology	Product Type	Target Segment	Significance	Comments
Desktops				
Windows XP Introduction	All desktops	All	Medium	The refreshed windows OS will breath life into the consumer segment, but will commercial buyers make the transition when budgets are tight?
633MHz, 667MHz, and 700MHz Intel Celer	Value desktops	Cost-sensitive business and I	Medium	Based on the same basic piece of silicon as are PIII chips. Include "SSE" multimedia extentions from the PIII.
933MHz Intel Pentium III processor	Performance desktops	Power users	Low	Fills in the last gap in Intel's current Pentium III lineup.
Intel 820E chipset	Performance desktops	Power users	Medium	Features a new I/O Controller Hub (ICH2), which integrates a LAN connect interface, which enables OEMs and system integrators to implement cost-effective network connections.
Intel 8215 and 815E chipset	Mainstream desktops	Mainstream users	High	Supports a wide range of PC configurations because of the integrated graphics-processing engine.
Portables				
1.2GHz PIII-M, 800MHz LV PIII-M, 700MHz Professional, high performance, n	Power users, semi-mobile, ul	High		Further rounds out Intel's mobile offerings. Increases pressure on Transmeta and AMD.
933MHz Celeron, 650MHz LV Celeron	Value, semi-mobile	Semi-mobile, consumer	Medium	Although based on 0.18 technology, value offering is key to capitalize on the fertile consumer portable space.
Intel 830M & MG chipsets	Mid-range and value	Semi-mobile, value	Medium	Rounds out Intel's mobile chipset family, M supports an integrated graphics controller and AGP4X Graphics while MG supports just the integrated graphics controller.
Windows XP Introduction	All portables	All	Medium	Projected as a significant driver of consumer shipments, but not enough to stimulate the commercial segment.
NVIDIA mobile GPU	Performance	Consumer	Medium	Power management software, anti-aliasing technology, and integrated video processing engine challenge ATI in the growing performance consumer space.

Source: IDC, 3Q01

EXHIBIT 31

Produced Natively

World Wide Monitor Production Forecast

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MONITOR MAKER	LOCATION			PRODUCTION (KP/M)									
			'97	'98					'99				
			TTL	1Q	2Q	3Q	4Q	TTL	1Q	2Q	3Q	4Q	TTL
ACER	TAIWAN	14"	0					0					0
		15"	648	33	23	12	10	234	18	17	29	29	280
		17"	450	51	51	80	76	774	57	32	47	51	560
		19"	0	1	1	5	7	42	10	10	13	17	150
		TTL	1,098	85	75	97	93	1,050	85	59	89	96	990
	MALAYSIA	14"	1,140	40	30	24	20	342					0
		15"	762	118	82	115	110	1,275	26	25	41	41	400
		17"	51	6	6	47	90	447	136	77	114	122	1,350
		TTL	1,953	164	118	186	220	2,064	163	102	155	163	1,750
	CHINA	14"	249	27	20	16	13	228	25	14	14	14	200
		15"	249	39	28	30	40	411	59	56	93	93	900
		17"	0	3	3	5	6	51	30	17	25	27	300
		TTL	498	69	51	51	59	690	114	87	132	134	1,400
	MEXICO	14"	0					0	5	3	3	3	40
		15"	0					0	13	12	21	21	200
		17"	0					0					0
		TTL	0	0	0	0	0	0	18	15	23	23	240
	TOTAL	14"	1,389	67	50	40	33	570	30	17	17	17	240
		15"	1,659	190	133	157	160	1,920	117	110	183	183	1,780
		17"	501	60	60	132	172	1,272	223	127	187	200	2,210
		19"	0	1	1	5	7	42	10	10	13	17	150
		TTL	3,549	318	244	334	372	3,804	380	263	400	417	4,380
ADI	TAIWAN	14"	0					0					0
		15"	420	26	20	32	32	330					0
		17"	1,017	33	30	48	53	492	17	14	19	22	220
		19"	42	7	10	20	26	189	30	20	20	20	270
		TTL	1,479	66	60	100	111	1,011	47	34	39	42	490
	THAILAND	14"	0					0					0
		15"	600	16	12	19	19	198	6	8	10	10	100
		17"	51	53	47	67	60	681	70	59	80	91	900
		TTL	651	69	59	86	79	879	76	67	89	101	1,000
	CHINA	14"	270	60	60	60	27	621	23	37	40	40	420
		15"	201	31	25	39	39	402	81	109	140	140	1,410
		17"	0					0					0
		TTL	471	91	85	99	66	1,023	104	146	180	180	1,830
	MEXICO	14"	0					0					0
		15"	0					0					0
		17"	0	7	7	9	10	99	16	13	18	20	200
		TTL	0	7	7	9	10	99	16	13	18	20	200
	TOTAL	14"	270	60	60	60	27	621	23	37	40	40	420
		15"	1,221	73	57	90	90	930	87	117	150	150	1,510
		17"	1,068	100	91	133	133	1,371	103	87	117	133	1,320
		19"	42	7	10	20	26	189	30	20	20	20	270
		TTL	2,601	240	218	303	276	3,111	243	260	327	343	3,520
BRIDGE	TAIWAN	14"	90	10	11	8	6	105					0
		15"	96	11	11	11	11	132	9	10	9	9	110
		17"	54	5	5	19	22	153	13	13	15	15	172
		19"					1	3	1	0	1	1	11
		TTL	240	26	27	38	40	393	23	23	26	26	293
	INDONESIA	14"	30	3	3	2	2	30	3	2	2	2	29
		15"	30	2	2	3	3	30	5	5	5	5	60
		17"	0					0	4	4	5	5	50
		TTL	60	5	5	5	5	60	12	11	11	11	139
	TOTAL	14"	120	13	14	10	8	135	3	2	2	2	29
		15"	126	13	13	14	14	162	13	15	14	14	170
		17"	54	5	5	19	22	153	17	17	20	20	222
		19"		0	0	0	1	3	1	0	1	1	11
		TTL	300	31	32	43	45	453	35	35	37	37	432
CAPE	TAIWAN	14"	0					0					0
		15"	0					0					0
		17"	432	17	14	19	19	207					0
		19"	12	14	14	20	20	204	35	27	20	20	305
		20"21"	0		1	2	8	33	4	7	6	6	68
		TTL	444	31	29	41	47	444	39	33	26	26	373
	THAILAND	14"	9					0					0
		15"	540	47	26	40	30	429	50	33	35	37	465
		17"	399	66	53	68	67	762	100	67	100	107	1,120
		19"	0					0					0
		20"21"	0					0					0
		TTL	948	113	79	108	97	1,191	150	100	135	143	1,585
	TOTAL	14"	9	0	0	0	0	0	0	0	0	0	0
		15"	540	47	26	40	30	429	50	33	35	37	465
		17"	831	83	67	87	86	969	100	67	100	107	1,120
		19"	12	14	14	20	20	204	35	27	20	20	305
		20"21"	0	0	1	2	8	33	4	7	6	6	68
		TTL	1,392	144	108	149	144	1,635	189	133	161	169	1,958

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CHUNTEX	TAIWAN	14"	0	21	25	37	39	0				0
		15"	411					366				0
		17"	549	24	24	48	37	399	44	45	37	28
		19"	0	4	5	30	30	207	13	10	10	7
		20"21"	0					0	2	1	1	1
	TTL		960	49	54	115	106	972	59	56	48	36
	THAILAND	14"	579	60	27	33	30	450	33	10	20	20
		15"	351	52	62	92	94	900	100	67	83	77
		17"	51	42	42	79	97	780	85	88	73	55
		19"	0					0				
		20"21"	0					0				
	TTL		981	154	131	204	221	2,130	218	165	176	152
	TOTAL	14"	579	60	27	33	30	450	33	10	20	20
		15"	762	73	87	129	133	1,266	100	67	83	77
		17"	600	66	66	127	134	1,179	128	133	110	83
		19"	0	4	5	30	30	207	13	10	10	7
		20"21"	0	0	0	0	0	0	2	1	1	1
	TTL		1,941	203	185	319	327	3,102	277	221	224	188
COMPAL	CHINA	14"	291	27	23	18	10	234	6	1	3	3
		15"	150	33	30	50	50	489	47	93	117	117
		17"	0	17	17	27	26	261	53	60	83	93
		19"	0		1	3	3	21	3	2	3	7
		20"21"	0					0				
	TTL		441	77	71	98	89	1,005	109	156	207	220
	TOTAL	14"	291	27	23	18	10	234	6	1	3	3
		15"	390	33	30	50	50	489	47	93	117	117
		17"	150	17	17	27	26	261	53	60	83	93
		19"	0	0	1	3	3	21	3	2	3	7
		20"21"	0	0	0	0	0	0	0	0	0	0
	TTL		831	77	71	98	89	1,005	109	156	207	220
DELTA	TAIWAN	14"	0	23	22	31	27	0				0
		15"	549					309				0
		17"	189	12	15	26	20	219	4	3	4	6
		19"	0		2	5	6	39	3	5	6	7
		20"21"	0					0				
	TTL		738	35	39	62	53	567	7	8	10	13
	THAILAND	14"	249	27	20	20	10	231	7	13	13	13
		15"	600	76	70	100	114	1,080	139	142	170	170
		17"	21	7	10	13	15	135	11	10	12	17
		19"	0					0				
		20"21"	0					0				
	TTL		870	110	100	133	139	1,446	157	165	195	200
	CHINA	14"	0					0				0
		15"	0	1	1	2	3	21	11	11	14	14
		17"	0	11	15	21	25	216	52	47	57	78
		19"	0					0	3	4	4	6
		20"21"	0					0				
	TTL		0	12	16	23	28	237	66	62	75	97
	TOTAL	14"	249	27	20	20	10	231	7	13	13	13
		15"	1,149	100	93	133	144	1,410	150	153	183	183
		17"	210	30	40	60	60	570	67	60	73	100
		19"	0	0	2	5	6	39	6	8	10	13
		20"21"	0	0	0	0	0	0	0	0	0	0
	TTL		1,608	157	155	218	220	2,250	229	235	280	310
FIC	CHINA	14"	48	3	3	3	4	39	2	1	1	1
		15"	45	10	10	20	14	162	15	11	16	16
		17"	0	1	2	7	10	60	5	3	8	8
		19"	0			1		3	0	0	1	1
		20"21"	0					0				
	TTL		93	14	15	31	28	264	22	16	26	26
	TOTAL	14"	48	3	3	3	4	39	2	1	1	1
		15"	111	10	10	20	14	162	15	11	16	16
		17"	0	1	2	7	10	60	5	3	8	8
		19"	0	0	0	1	0	3	0	0	1	1
		20"21"	0	0	0	0	0	0	0	0	0	0
	TTL		159	14	15	31	28	264	22	16	26	26

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PHILIPS	TAIWAN	14"	699	33	27	44	32	0	36	33	42	42	0
		15"	1,521	76	102	128	128	408	97	93	130	130	460
		17"	909	31	47	40	39	1,302	19	17	29	29	1,350
		19"	78	3	3	5	10	471	10	9	10	10	285
		20"21"	96					63					116
	TTL		3,303	143	179	217	209	2,244	163	152	211	211	2,211
	MEXICO	14"	699	56	50	50	44	600	45	42	53	53	0
		15"	450	62	52	83	86	849	170	161	226	226	580
		17"	300	65	87	108	107	1,101	14	12	21	21	2,350
		19"	0	7	10	12	11	120					200
		20"21"	0					0					0
	TTL		1,449	190	199	253	248	2,670	229	215	300	300	3,130
	HUNGARY	14"	300	37	33	33	30	399	64	59	75	75	0
		15"	501	36	30	48	53	501	36	34	48	48	820
		17"	0	35	47	59	59	600	7	6	10	10	500
		19"	0	2	3	2	3	30					100
		20"21"	0					0					0
	TTL		801	110	113	142	145	1,530	107	100	133	133	1,420
	CHINA	14"	699	56	50	50	51	621	61	70	68	68	798
		15"	450	62	51	82	89	852	117	108	137	137	1,500
		17"	0	24	31	38	56	447	47	45	63	63	650
		19"	0					0					0
		20"21"	0					0					0
	TTL		1,149	142	132	170	196	1,920	225	223	267	267	2,948
	BRAZIL	14"	201	18	17	17	15	201	14	16	16	16	185
		15"	99	7	6	10	10	99	8	7	9	9	100
		17"	0					0					0
		19"	0					0					0
		20"21"	0					0					0
	TTL		300	25	23	27	25	300	22	23	25	25	285
	TOTAL	14"	2,598	167	150	150	140	1,821	75	86	83	83	983
		15"	3,021	200	166	267	270	2,709	270	250	317	317	3,460
		17"	1,209	200	267	333	350	3,450	350	333	467	467	4,850
		19"	78	40	60	54	53	621	40	35	60	60	585
		20"21"	96	3	3	5	10	63	10	9	10	10	116
	TTL		7,002	610	646	809	823	8,664	745	713	937	937	9,993
SAMPO	TAIWAN	14"	0	12	7	11	11	0					0
		15"	99	25	23	31	31	123					0
		17"	270	5	5	11	13	330	38	42	38	39	475
		19"	36	1	1	1	1	102	17	20	23	23	250
		20"21"	18					12	2	2	2	2	20
	TTL		423	43	36	54	56	567	57	64	63	64	745
	PHILIPINE	14"	231	13	10	10	10	129	8	8	7	7	90
		15"	150	18	11	19	19	201	40	33	33	33	420
		17"	0	2	1	2	2	21	28	31	28	29	350
		19"	0					0					0
		20"21"	0					0					0
	TTL		381	33	22	31	31	351	77	73	68	69	860
	TOTAL	14"	231	13	10	10	10	129	8	8	7	7	90
		15"	249	30	18	30	30	324	40	33	33	33	420
		17"	270	27	24	33	33	351	67	73	67	68	825
		19"	36	5	5	11	13	102	17	20	23	23	250
		20"21"	18	1	1	1	1	12	2	2	2	2	20
	TTL		804	76	58	85	87	918	133	137	132	133	1,605
TATUNG	TAIWAN	14"	1,089	36	29	15	8	264	30	38	38	38	0
		15"	600	45	60	82	54	723	22	15	15	16	430
		17"	39	1	32	47	34	342	10	3	2	2	200
		19"	0		2	9	12	69					50
		20"21"	6					0					0
	TTL		1,734	82	123	153	108	1,398	62	56	54	55	680
	THAILAND	14"	351	27	22	12	9	210	20	3	2	2	78
		15"	201	29	39	51	45	492	60	75	75	75	850
		17"	0		8	13	13	102	33	22	22	24	300
		19"	0					0					0
		20"21"	0					0					0
	TTL		552	56	69	76	67	804	112	99	98	100	1,228
	UK	14"	99	13	11	6	3	99	3	4	4	4	0
		15"	0					0	5	4	4	4	50
		17"	0					0					50
		19"	0					0					0
		20"21"	0					0					0
	TTL		99	13	11	6	3	99	9	8	8	8	100
	TOTAL	14"	1,539	76	62	33	20	573	20	3	2	2	78
		15"	801	74	99	133	99	1,215	93	117	117	117	1,330
		17"	39	1	40	60	47	444	60	40	40	43	550
		19"	0	0	2	9	12	69	10	3	2	2	50
		20"21"	6	0	0	0	0	0	0	0	0	0	0
	TTL		2,385	151	203	235	178	2,301	183	163	160	163	2,008

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KUOFENG	TAIWAN	14"	126					0					0
		15"	189	25	21	28	20	282	14	11	15	15	165
		17"	195	14	12	30	27	249	42	25	50	50	500
		19"	0		1	2	2	15	5	5	7	8	75
		20"21"	0					0					0
	TTL		510	39	34	60	49	546	60	41	72	73	740
	INDONESIA	14"	99	15	10	7	10	126	7	4	3	3	52
		15"	0	8	6	8	11	99	16	14	18	18	200
		17"	0					0	8	5	10	10	100
		19"	0					0					0
		20"21"	0					0					0
	TTL		99	23	16	15	21	225	31	23	32	32	352
	TOTAL	14"	225	15	10	7	10	126	7	4	3	3	52
		15"	189	33	27	36	31	381	30	25	33	33	365
		17"	195	14	12	30	27	249	50	30	60	60	600
		19"	0	0	1	2	2	15	5	5	7	8	75
		20"21"	0	0	0	0	0	0	0	0	0	0	0
	TTL		609	62	50	75	70	771	92	64	103	105	1,092
LITE-ON	TAIWAN	14"	0					0					0
		15"	558	25	25	25		225					0
		17"	519	46	46	46	5	429					0
		19"	3	2	1	2	2	21					0
		20"21"	0					0					0
	TTL		1,080	73	72	73	7	675	0	0	0	0	0
	CHINA	14"	186	87	64	83	53	861	27	20	20	20	260
		15"	150	92	91	102	93	1,134	93	83	103	117	1,190
		17"	0	1	27	54	95	531	132	133	193	200	1,975
		19"	0					0	2	2	22	23	147
		20"21"	0					0					0
	TTL		336	180	182	239	241	2,526	254	239	338	360	3,572
	TOTAL	14"	1,374	87	64	83	53	861	27	20	20	20	260
		15"	1,461	117	116	127	93	1,359	93	83	103	117	1,190
		17"	519	47	73	100	100	960	132	133	193	200	1,975
		19"	3	2	1	2	2	21	2	2	22	23	147
		20"21"	0	0	0	0	0	0	0	0	0	0	0
	TTL		3,357	253	254	312	248	3,201	254	239	338	360	3,572
MAG-TECH	TAIWAN	14"	0					0					0
		15"	45	7	6	8	9	90					0
		17"	858	38	35	56	76	615	12	16	16	17	182
		19"	210	10	2	5	5	66	4	2	3	7	49
		20"21"	33	2	1	2	1	18	0	0	0	0	4
	TTL		1,146	57	44	71	91	789	16	19	19	24	235
	INDONESIA	14"	0					0					0
		15"	99	4	3	5	5	51					0
		17"	201	37	35	54	74	600	65	92	87	96	1,020
		19"	0					0					0
		20"21"	0					0					0
	TTL		300	41	38	59	79	651	65	92	87	96	1,020
	CHINA	14"	168	10	7	1	2	60	1	1	1	1	15
		15"	300	22	22	27	29	300	30	47	50	50	530
		17"	0					0	18	25	24	26	280
		19"	0					0					0
		20"21"	0					0					0
	TTL		468	32	29	28	31	360	49	73	75	78	825
	TOTAL	14"	168	10	7	1	2	60	1	1	1	1	15
		15"	444	33	31	40	43	441	30	47	50	50	530
		17"	1,059	75	70	110	150	1,215	94	133	127	140	1,482
		19"	210	10	2	5	5	66	4	2	3	7	49
		20"21"	33	2	1	2	1	18	0	0	0	0	4
	TTL		1,914	130	111	158	201	1,800	130	183	182	198	2,080

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TECO	TAIWAN	14"		25	15	12	10	186				0
		15"		17	20	33	30	300	41	41	49	540
		17"			2	4	3	27	3	3	3	40
		19"						0				0
		20"21"						0				0
	INDONESIA	TTL	0	42	37	49	43	513	45	45	52	580
		14"	81	20	8	5	5	114	3			10
		15"	30	8	5	10	10	99	17	10	17	180
		17"	39	17	20	17	13	201	15	15	18	200
		19"	0					0				0
	TOTAL	20"21"	0					0				0
		TTL	150	45	33	32	28	414	35	25	35	390
		14"	81	20	8	5	5	114	3	0	0	10
		15"	30	33	20	22	20	285	17	10	17	180
		17"	39	34	40	50	43	501	57	57	67	740
		19"	0	0	2	4	3	27	3	3	3	40
		20"21"	0	0	0	0	0	0	0	0	0	0
		TTL	150	87	70	81	71	927	80	70	87	970
GVC	CHINA	14"	480	20	17	27	26	270	3			10
		15"	180	23	17	40	50	390	17			50
		17"	0	7	5	27	29	204	10			30
		19"	0					0	3			10
		20"21"	0					0				0
	TOTAL	TTL	660	50	39	94	105	864	33	0	0	100
		14"	480	20	17	27	26	270	3	0	0	10
		15"	282	23	17	40	50	390	17	0	0	50
		17"	75	7	5	27	29	204	10	0	0	30
		19"	0	0	0	5	7	36	3	0	0	10
	TOTAL	20"21"	0	0	0	0	0	0	0	0	0	0
		TTL	837	50	39	99	112	900	33	0	0	100
ESSEX	TAIWAN	14"	0					0				0
		15"	168	13	13	13	13	156				0
		17"	51	8	8	9	8	99	15	8	14	160
		19"	0			3	5	24	10	13	17	170
		20"21"	0					0				0
	CHINA	TTL	219	21	21	25	26	279	25	22	30	330
		14"	450	50	33	67	67	651	50	57	50	620
		15"	201	67	54	87	107	945	113	83	100	1,190
		17"	60	42	52	65	75	702	92	52	86	1,000
		19"	0					0				0
	TOTAL	20"21"	0					0				0
		TTL	711	159	139	219	249	2,298	255	192	236	253
		14"	450	50	33	67	67	651	50	57	50	620
		15"	369	80	67	100	120	1,101	113	83	100	1,190
		17"	111	50	60	74	83	801	107	60	100	1,160
	TOTAL	19"	0	0	0	3	5	24	10	13	17	170
		20"21"	0	0	0	0	0	0	0	0	0	0
		TTL	930	180	160	244	275	2,577	280	213	267	287
SHAMROCK	TAIWAN	14"	210	5	4	6	7	0				0
		15"	330					66				0
		17"	186	20	15	20	23	234	8	3	3	40
		19"	0			1	2	9	2	1	1	11
		20"21"	0					0				0
	CHINA	TTL	726	25	19	27	32	309	9	4	4	51
		14"	0	27	20	23	23	279	10			30
		15"	0	25	21	27	27	300	23	10	7	120
		17"	0					0	19	7	7	100
		19"	0					0				0
	TOTAL	20"21"	0					0				0
		TTL	0	52	41	50	50	579	52	17	14	250
		14"	330	27	20	23	23	279	10	0	0	30
		15"	330	30	25	33	34	366	23	10	7	120
		17"	186	20	15	20	23	234	27	10	10	140
	TOTAL	19"	0	0	0	1	2	9	2	1	1	11
		20"21"	0	0	0	0	0	0	0	0	0	0
		TTL	846	77	60	77	82	888	62	21	18	301

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JEAN	TAIWAN	14"	90					0					0
		15"	210	2	2	3	3	30					0
		17"	150	15	17	39	41	336	39	35	33	35	430
		19"	0			2	3	15	8	8	10	10	110
		20"21"	0					0					0
	MALAYSIA	TTL	450	17	19	44	47	381	48	44	43	45	540
		14"	651	40	31	39	40	450	28	18	11	11	200
		15"	69	45	36	91	84	768	88	85	76	76	970
		17"	0	2	3	21	26	156	27	25	23	25	300
		19"	0					0					0
	INDONESIA	20"21"	0					0					0
		TTL	720	87	70	151	150	1,374	143	127	109	111	1,470
		14"	300	27	22	31	27	321					0
		15"	0	3	2	6	6	51					0
		17"	0					0					0
	CHINA	19"	0					0					0
		20"21"	0					0					0
		TTL	300	30	24	37	33	372	0	0	0	0	0
		14"							25	16	9	9	180
		15"							9	9	8	8	100
TOTAL	17"											0	
	19"											0	
	20"21"											0	
	TTL							34	25	17	17	280	
	14"	1,041	67	53	70	67	771	53	33	20	20	380	
TOTAL	15"	279	50	40	100	93	849	97	93	83	83	1,070	
	17"	150	17	20	60	67	492	67	60	57	60	730	
	19"	0	0	0	2	3	15	8	8	10	10	110	
	20"21"	0	0	0	0	0	0	0	0	0	0	0	
	TTL	1,470	134	113	232	230	2,127	225	195	170	173	2,290	

ROYAL	TAIWAN	14"	0	39	35	59	58	0	25	19	26	26	0	
		15"	129					0					0	
		17"	282					573					290	
		19"	0					162					300	
		20"21"	0					0					0	
	CHINA	TTL	411	39	42	79	85	735	45	39	56	56	590	
		14"	348	23	22	10	3	174	7	7	10	10	100	
			15"	300	50	40	50	67	621	80	70	77	77	910
			17"	48	28	25	58	58	507	88	65	90	90	1,000
			19"	0					0					0
			20"21"	0					0					0
		TTL	696	101	87	118	128	1,302	175	141	177	177	2,010	
		TOTAL	14"	348	23	22	10	3	174	7	7	10	10	100
			15"	429	50	40	50	67	621	80	70	77	77	910
17"			330	67	60	117	116	1,080	113	83	117	117	1,290	
19"	0		0	7	20	27	162	20	20	30	30	300		
20"21"	0		0	0	0	0	0	0	0	0	0	0		
TTL	1,107	140	129	197	213	2,037	220	180	233	233	2,600			

TVM	TAIWAN	14"	0	16	8	27	43	0	33	28	33	33	0
		15"	0					282					
		17"	0					93					
		19"	0					0					
		20"21"	0					0					
	TTL	0	16	9	37	63	375	42	38	45	45	510	
	INDONESIA	14"	255	34	17	20	16	261	20	13	10	10	160
		15"	90	24	12	24	23	249	17	15	17	17	200
		17"	0	3	9	4	4	5	5	50			
		19"	0										
		20"21"	0										
	TTL	345	58	29	44	42	519	41	32	32	32	410	
	TOTAL	14"	255	34	17	20	16	261	20	13	10	10	160
		15"	90	40	20	51	66	531	50	43	50	50	580
		17"	0	0	1	10	23	102	13	13	17	17	180
19"		0	0	0	0	0	0	0	0	0	0	0	
20"21"		0	0	0	0	0	0	0	0	0	0	0	
TTL	345	74	38	81	105	894	83	70	77	77	920		

TOPFLY	TAIWAN	14"	0					0					0
		15"	33	8	8	8	8	96	8	7	6	6	76
		17"	0	4	4	4	4	48	4	4	4	4	47
		19"	0					0					0
		20"21"	0					0					0
	TTL	33	12	12	12	12	144	11	11	10	10	123	
	TOTAL	14"	0	0	0	0	0	0	0	0	0	0	0
		15"	33	8	8	8	8	96	8	7	6	6	76
		17"	0	4	4	4	4	48	4	4	4	4	47
		19"	0	0	0	0	0	0	0	0	0	0	0
20"21"		0	0	0	0	0	0	0	0	0	0	0	
TTL	33	12	12	12	12	144	11	11	10	10	123		

AMTRAN	14"	0					0					0
	15"	0					0					0
	17"	42	5	5	10	12	96	7	5	7	7	75
	19"	0	1	4	7	8	60	7	10	12	13	125
	20"21"	0					0					5

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	TAIWAN	TTL	42	6	9	17	20	156	13	15	19	21	205
		14"	0	0	0	0	0	0	0	0	0	0	0
		15"	0	0	0	0	0	0	0	0	0	0	0
		17"	42	5	5	10	12	96	7	5	7	7	75
		19"	0	1	4	7	8	60	7	10	12	13	125
		20"21"	0	0	0	0	0	0	0	0	1	1	5
	TOTAL	TTL	42	6	9	17	20	156	13	15	19	21	205
AOC		14"	861	73	93	84	80	990	110	150	133	127	1,560
		15"	411	53	100	150	200	1,509	143	120	150	150	1,690
		17"	96	23	21	60	103	621	92	63	100	120	1,126
		19"	0					0		2	2	3	22
		TTL	1,368	149	214	294	383	3,120	345	335	385	400	4,398
	CHINA	14"	861	73	93	84	80	990	110	150	133	127	1,560
		15"	411	53	100	150	200	1,509	143	120	150	150	1,690
		17"	96	23	21	60	103	621	92	63	100	120	1,126
		19"	0				1	3	0	2	2	3	22
		TTL	1,368	149	214	294	383	3,120	345	335	385	400	4,398
	TOTAL	TTL	1,368	149	214	294	383	3,120	345	335	385	400	4,398

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SAMSUNG	KOREA	14"	363	3	1	1		15	3	2	2	2	27
		15"	2,190	202	193	231	257	2,649	163	136	144	175	1,855
		17"	2,364	205	178	159	135	2,031	212	177	178	200	2,300
		19"	0	2	8	9	8	81	24	26	34	50	404
		20"21"	84	3	2	3	4	36	7	7	8	8	88
		TTL	5,001	415	382	403	404	4,812	409	347	367	435	4,674
	MALAYSIA	14"	1,308	79	62	37	31	627	20	40	41	23	373
		15"	414	63	64	93	97	951	109	105	129	135	1,434
		17"	60	11	14	20	27	216	25	32	39	55	452
		19"	0					0					0
		20"21"	0					0					0
		TTL	1,782	153	140	150	155	1,794	154	177	208	213	2,259
	UK	14"	354					0					0
		15"	570	76	8	43	24	453	37	28	26	35	377
		17"	420	27	49	59	89	672	92	80	95	100	1,100
		19"	0					0					0
		20"21"	0					0					0
		TTL	1,344	103	57	102	113	1,125	128	108	121	135	1,477
	MEXICO	14"	312	25	41	29	28	369	15	20	29	15	237
		15"	360	66	70	102	101	1,017	108	93	112	120	1,301
		17"	90	2	4	9	23	114	49	76	86	100	934
		19"	0					0					0
		20"21"	0					0					0
		TTL	762	93	115	140	152	1,500	172	190	227	235	2,472
	BRAZIL	14"	0		2	5	10	51	5	12	22	18	173
		15"	0		1	5	10	48	3	6	13	15	110
		17"	0					0	1	1	2	2	18
		19"	0					0					0
		20"21"	0					0					0
		TTL	0	0	3	10	20	99	9	19	37	35	301
	CHINA	14"	0	10	7	10	16	129	18	22	19	12	213
		15"	0		9	22	22	159	32	49	72	80	698
		17"	0				4	12	7	8	17	20	159
		19"	0					0					0
		20"21"	0					0					0
		TTL	0	10	16	32	42	300	57	80	108	112	1,070
	TOTAL	14"	2,337	117	113	82	85	1,191	61	96	113	70	1,023
		15"	3,534	407	345	496	511	5,277	452	417	495	560	5,775
		17"	2,934	245	245	247	278	3,045	385	374	418	477	4,963
		19"	0	2	8	9	8	81	24	26	34	50	404
		20"21"	84	3	2	3	4	36	7	7	8	8	88
		TTL	8,889	774	713	837	886	9,630	930	921	1,068	1,165	12,253
LG	KOREA	14"	351	23	15	7	2	141	3	1	0	0	13
		15"	2,103	176	179	226	296	2,631	150	180	170	37	1,610
		17"	651	54	66	69	86	825	95	120	127	137	1,435
		19"	15	2	3	4	9	54	25	30	41	49	435
		20"21"	30					0	2	2	2	2	25
		TTL	3,150	255	263	306	393	3,651	275	333	339	225	3,518
	MEXICO	14"	54					0					0
		15"	273	67	85	78	82	936	55	23	82	100	780
		17"	258	70	49	55	64	714	45	35	60	70	630
		19"	0					0					0
		20"21"	0					0					0
		TTL	585	137	134	133	146	1,650	100	58	142	170	1,410
	BRAZIL	14"	132	16	22	19	23	240	14	32	50	63	478
		15"	24	5	17	28	12	186	7	25	33	28	282
		17"	0		3	3	3	27	1	1	6	5	39
		19"	0					0					0
		20"21"	0					0					0
		TTL	156	21	42	50	38	453	23	58	89	97	799
	INDONESIA	14"	402	44	43	53	31	513	33	20	3	3	179
		15"	204	11	14	25	26	228	60	53	58	63	703
		17"	3	1				3	8	13	25	30	230
		19"	0					0					0
		20"21"	0					0					0
		TTL	609	56	57	78	57	744	102	87	86	96	1,112
	UK	14"	0					0					0
		15"	0	23	29	36	34	366	11	10	28	55	312
		17"	0	4	7	23	36	210	27	32	35	40	400
		19"	0					0					0
		20"21"	0					0					0
		TTL	0	27	36	59	70	576	37	42	63	95	712
	CHINA	14"	0					0	3	4	20	27	160
		15"	0				12	36	9	13	23	25	212
		17"	0					0					0
		19"	0					0					0
		20"21"	0					0					0
		TTL	0	0	0	0	12	36	12	17	43	52	372
	TOTAL	14"	939	83	80	79	56	894	53	57	73	93	830
		15"	2,604	282	324	393	462	4,383	292	305	394	308	3,899
		17"	912	129	125	150	189	1,779	176	201	253	282	2,734
		19"	15	2	3	4	9	54	25	30	41	49	435
		20"21"	30	0	0	0	0	0	2	2	2	2	25
		TTL	4,500	496	532	626	716	7,110	548	595	763	735	7,923

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DAEWOO	KOREA	14"	381	43	37	30	15	375	2				5
		15"	900	53	52	85	172	1,086	162	187	190	195	2,200
		17"	153	22	25	26	36	327	45	63	75	83	800
		19"	0			1	4	15	4	6	9	11	92
		20"21"	0					0					0
	TTL		1,434	118	114	142	227	1,803	213	256	274	289	3,097
	MEXICO	14"	285	15	17	20	20	216	29	33	12	5	239
		15"	36	10	10	20	30	210	62	65	70	70	800
		17"	0					0					0
		19"	0					0					0
		20"21"	0					0					0
	TTL		321	25	27	40	50	426	91	98	82	75	1,039
	CHINA	14"	51	10	15	10	10	135	7	14	19	20	180
		15"	0	5	10	10	15	120	30	35	32	35	396
		17"	0					0					0
		19"	0					0					0
		20"21"	0					0					0
	TTL		51	15	25	20	25	255	37	49	51	55	576
	TOTAL	14"	717	68	69	60	45	726	38	47	31	25	424
		15"	936	68	72	115	217	1,416	253	287	292	300	3,396
		17"	153	22	25	26	36	327	45	63	75	83	800
		19"	0	0	0	1	4	15	4	6	9	11	92
		20"21"	0	0	0	0	0	0	0	0	0	0	0
	TTL		1,806	158	166	202	302	2,484	340	404	407	419	4,712

HYUNDAI	KOREA	14"	372	10	10	10	10	120	5	4	4	4	51
		15"	660	90	100	100	84	1,122	62	50	60	65	711
		17"	222	20	20	20	62	366	45	37	44	47	517
		19"	0			1	1	6	3	6	8	9	77
		20"21"	9		1	1	1	9	1	1	1	2	15
	TTL		1,263	120	131	132	158	1,623	116	98	117	127	1,371
	CHINA	14"	0					0	1	3	5	8	50
		15"	0					0	0	10	20	25	166
		17"	0					0					0
		19"	0					0					0
		20"21"	0					0					0
	TTL		0	0	0	0	0	0	1	13	25	33	216
	TOTAL	14"	372	10	10	10	10	120	6	7	9	12	101
		15"	660	90	100	100	84	1,122	62	60	80	90	877
		17"	222	20	20	20	62	366	45	37	44	47	517
		19"	0	0	0	1	1	6	3	6	8	9	77
		20"21"	9	0	1	1	1	9	1	1	1	2	15
	TTL		1,263	120	131	132	158	1,623	117	111	142	160	1,587

KDS	KOREA	14"	411	18	13	14	9	162	5	3			25
		15"	480	45	36	27	38	438	42	42	47	67	590
		17"	378	45	57	66	59	681	62	75	85	90	937
		19"	3			23	35	174	28	27	27	38	359
		20"21"	33	2	3	2	2	27	2	2	3	4	33
	TTL		1,305	110	109	132	143	1,482	139	149	161	199	1,944
	GERMANY	14"	0					0					0
		15"	87	2				6					0
		17"	63	1				3					0
		19"	0					0					0
		20"21"	0					0					0
	TTL		150	3	0	0	0	9	0	0	0	0	0
	TOTAL	14"	411	18	13	14	9	162	5	3	0	0	25
		15"	567	47	36	27	38	444	42	42	47	67	590
		17"	441	46	57	66	59	684	62	75	85	90	937
		19"	3	0	0	23	35	174	28	27	27	38	359
		20"21"	33	2	3	2	2	27	2	2	3	4	33
	TTL		1,455	113	109	132	143	1,491	139	149	161	199	1,944

ORION	KOREA	14"	480	20	15	15	10	180	13	8	0	0	65
		15"	288	25	23	21	20	267	40	43	45	53	545
		17"	57	14	20	22	25	243	17	27	35	43	365
		19"	0					0	3	9	10	11	97
		20"21"	0					0					0
	TTL		825	59	58	58	55	690	73	87	90	108	1,072
	TOTAL	14"	480	20	15	15	10	180	13	8	0	0	65
		15"	288	25	23	21	20	267	40	43	45	53	545
		17"	57	14	20	22	25	243	17	27	35	43	365
		19"	0	0	0	0	0	0	3	9	10	11	97
		20"21"	0	0	0	0	0	0	0	0	0	0	0
	TTL		825	59	58	58	55	690	73	87	90	108	1,072

HANSOL	KOREA	14"	54	5	5	2		36					0
		15"	162	12	14	7	2	105	7	6	7	7	81
		17"	108	13	20	13	17	189	20	20	29	36	313
		19"	0		1	3	6	30	3	9	10	11	100
		20"21"	0					0					0
	TTL		324	30	40	25	25	360	30	35	46	54	494
		14"	150	29	27	17	6	237	8	4	5	5	66
		15"	117	23	18	16	14	213	15	14	18	20	201
		17"	6					0					0
		19"	0					0					0
		20"21"	0					0					0

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	THAILAND	TTL	273	52	45	33	20	450	23	18	23	25	267
		14"	204	34	32	19	6	273	8	4	5	5	66
		15"	279	35	32	23	16	318	22	20	25	27	282
		17"	114	13	20	13	17	189	20	20	29	36	313
		19"	0	0	1	3	6	30	3	9	10	11	100
		20"21"	0	0	0	0	0	0	0	0	0	0	0
TOTAL		TTL	597	82	85	58	45	810	52	53	69	79	761

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ASKA	CHINA	14"	36	4	4	5	7	60	4	4	4	4	50
		15"	12	1	2	2	2	21	2	2	2	2	20
		17"	0					0					0
		19"	0					0					0
		20"21"	0					0					0
		TTL	48	5	6	7	9	81	6	6	6	6	70
	TOTAL	14"	36	4	4	5	7	60	4	4	4	4	50
		15"	12	1	2	2	2	21	2	2	2	2	20
		17"	0	0	0	0	0	0	0	0	0	0	0
		19"	0	0	0	0	0	0	0	0	0	0	0
		20"21"	0	0	0	0	0	0	0	0	0	0	0
TTL		48	5	6	7	9	81	6	6	6	6	70	
CGC	CHINA	14"	201	20	21	21	21	249	25	25	25	25	300
		15"	9	20	21	21	22	252	25	25	25	25	300
		17"	3	1	1	1	1	12	2	2	2	2	20
		19"	0					0					0
		20"21"	0					0					0
		TTL	213	41	43	43	44	513	52	52	52	52	620
	TOTAL	14"	201	20	21	21	21	249	25	25	25	25	300
		15"	9	20	21	21	22	252	25	25	25	25	300
		17"	3	1	1	1	1	12	2	2	2	2	20
		19"	0	0	0	0	0	0	0	0	0	0	0
		20"21"	0	0	0	0	0	0	0	0	0	0	0
TTL		213	41	43	43	44	513	52	52	52	52	620	
FOUNDER	CHINA	14"	180	10	11	11	11	129	21	21	21	21	250
		15"	90	9	9	10	9	111	21	21	21	21	250
		17"	0					0	1	1	1	1	10
		19"	0					0					0
		20"21"	0					0					0
		TTL	270	19	20	21	20	240	42	42	42	42	510
	TOTAL	14"	180	10	11	11	11	129	21	21	21	21	250
		15"	90	9	9	10	9	111	21	21	21	21	250
		17"	0	0	0	0	0	0	1	1	1	1	10
		19"	0	0	0	0	0	0	0	0	0	0	0
		20"21"	0	0	0	0	0	0	0	0	0	0	0
TTL		270	19	20	21	20	240	42	42	42	42	510	
OTHERS	CHINA	14"	87	4	4	5	4	51	4	4	4	4	50
		15"	36	4	4	5	4	51	4	4	4	4	50
		17"	0	4	4	4	4	48	4	4	4	4	50
		19"	0					0					0
		20"21"	0					0					0
		TTL	123	12	12	14	12	150	12	12	12	12	150
	TOTAL	14"	87	4	4	5	4	51	4	4	4	4	50
		15"	36	4	4	5	4	51	4	4	4	4	50
		17"	0	4	4	4	4	48	4	4	4	4	50
		19"	0	0	0	0	0	0	0	0	0	0	0
		20"21"	0	0	0	0	0	0	0	0	0	0	0
TTL		123	12	12	14	12	150	12	12	12	12	150	
WESTLAKE	CHINA	14"	48	2	3	3	2	30	0	0	0	0	5
		15"	48	1	2	2	2	21	0	0	0	0	5
		17"	180	8	8	9	8	99	25	25	25	25	300
		19"	0					0					0
		20"21"	0					0					0
		TTL	276	11	13	14	12	150	26	26	26	26	310
	TOTAL	14"	48	2	3	3	2	30	0	0	0	0	5
		15"	48	1	2	2	2	21	0	0	0	0	5
		17"	180	8	8	9	8	99	25	25	25	25	300
		19"	0	0	0	0	0	0	0	0	0	0	0
		20"21"	0	0	0	0	0	0	0	0	0	0	0
TTL		276	11	13	14	12	150	26	26	26	26	310	
XOCECO	CHINA	14"	120	25	26	26	26	309	18	18	18	18	220
		15"	24	5	6	6	6	69	29	29	29	29	350
		17"	0				1	3	8	8	8	8	100
		19"	0					0					0
		20"21"	0					0					0
		TTL	144	30	32	32	33	381	56	56	56	56	670
	TOTAL	14"	120	25	26	26	26	309	18	18	18	18	220
		15"	24	5	6	6	6	69	29	29	29	29	350
		17"	0	0	0	0	1	3	8	8	8	8	100
		19"	0	0	0	0	0	0	0	0	0	0	0
		20"21"	0	0	0	0	0	0	0	0	0	0	0
TTL		144	30	32	32	33	381	56	56	56	56	670	

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STESA	SINGAPORE	14"	0					0					0	
		15"	0					0					0	
		17"	0		1	1	2	12		3	3	3	3	39
		19"	0					0					0	
		20"21"	90	8	8	8	7	93	8	8	8	8	96	
	TTL	90	8	9	9	9	105	11	11	11	11	135		
	TOTAL	14"	0	0	0	0	0	0	0	0	0	0	0	
		15"	0	0	0	0	0	0	0	0	0	0	0	
		17"	0	0	1	1	2	12	3	3	3	3	39	
		19"	0	0	0	0	0	0	0	0	0	0	0	
		20"21"	90	8	8	8	7	93	8	8	8	8	96	
TTL	90	8	9	9	9	105	11	11	11	11	135			

LIKOM	MALAYSIA	14"	360	40	48	57	40	555	20	20	30	35	315
		15"	375	38	46	59	50	579	20	20	30	35	315
		17"	9	3	5	6	30	132	20	25	30	40	345
		19"	0				10	30	10	10	20	20	180
		20"21"	0					0					0
	TTL	744	81	99	122	130	1,296	70	75	110	130	1,155	
	TOTAL	14"	360	40	48	57	40	555	20	20	30	35	315
		15"	375	38	46	59	50	579	20	20	30	35	315
		17"	9	3	5	6	30	132	20	25	30	40	345
		19"	0	0	0	0	10	30	10	10	20	20	180
		20"21"	0	0	0	0	0	0	0	0	0	0	0
TTL	744	81	99	122	130	1,296	70	75	110	130	1,155		

GALINDRA	INDONESIA	14"	321	7	10	10	3	90	2	3	3	4	35
		15"	147	6	7	7	7	81	5	9	10	13	112
		17"	0					0					0
		19"	0					0					0
		20"21"	0					0					0
	TTL	468	13	17	17	10	171	7	12	13	17	147	
	TOTAL	14"	321	7	10	10	3	90	2	3	3	4	35
		15"	147	6	7	7	7	81	5	9	10	13	112
		17"	0	0	0	0	0	0	0	0	0	0	0
		19"	0	0	0	0	0	0	0	0	0	0	0
		20"21"	0	0	0	0	0	0	0	0	0	0	0
TTL	468	13	17	17	10	171	7	12	13	17	147		

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NOKIA	FINLAND	14"	0					0					0
		15"	171					0					0
		17"	1,023	30	35	32	40	411	30	30	10	3	220
		19"	6	7	9	10	13	117	7	7	2		45
		20"21"	108	8	10	10	12	120	8	10	2	2	65
		TTL	1,308	45	54	52	65	648	45	47	13	5	330
	HUNGARY	14"	0					0					0
		15"	0					0					0
		17"	0	60	67	53	70	750	60	83	100	100	1,030
		19"	0					0	7	7	7	7	80
		20"21"	0					0			7	10	50
		TTL	0	60	67	53	70	750	67	90	113	117	1,160
	TOTAL	14"	0	0	0	0	0	0	0	0	0	0	0
		15"	171	0	0	0	0	0	0	0	0	0	0
		17"	1,023	90	102	85	110	1,161	90	113	110	103	1,250
		19"	6	7	9	10	13	117	13	13	8	7	125
		20"21"	108	8	10	10	12	120	8	10	8	12	115
		TTL	1,308	105	121	105	135	1,398	112	137	127	122	1,490
MICROVITEC	UK	14"	6	1	1	1	1	12	1	1	1	1	16
		15"	9	1	2	2	2	21	2	2	2	2	28
		17"	9					0					0
		19"	0					0					0
		20"21"	0					0					0
		TTL	24	2	3	3	3	33	4	4	4	4	44
	TOTAL	14"	6	1	1	1	1	12	1	1	1	1	16
		15"	9	1	2	2	2	21	2	2	2	2	28
		17"	9	0	0	0	0	0	0	0	0	0	0
		19"	0	0	0	0	0	0	0	0	0	0	0
		20"21"	0	0	0	0	0	0	0	0	0	0	0
		TTL	24	2	3	3	3	33	4	4	4	4	44
CLAIREMONT	UK	14"	51	4	4	4	5	51	3	3	2		25
		15"	78	7	6	5	9	81	7	7	3		50
		17"	21	1	2	1	2	18	2	2	2		15
		19"	0					0					0
		20"21"	0					0					0
		TTL	150	12	12	10	16	150	12	12	7	0	90
	TOTAL	14"	51	4	4	4	5	51	3	3	2	0	25
		15"	78	7	6	5	9	81	7	7	3	0	50
		17"	21	1	2	1	2	18	2	2	2	0	15
		19"	0	0	0	0	0	0	0	0	0	0	0
		20"21"	0	0	0	0	0	0	0	0	0	0	0
		TTL	150	12	12	10	16	150	12	12	7	0	90
VESTEL	TURKEY	14"	39	3	3	3	3	36	3	3	3	3	40
		15"	39	3	3	4	3	39	5	5	7	7	70
		17"	3				1	3	2	2	2	2	20
		19"	0					0					0
		20"21"	0				1	3					0
		TTL	81	6	6	7	8	81	10	10	12	12	130
	TOTAL	14"	39	3	3	4	3	39	3	3	3	3	40
		15"	39	3	3	4	3	39	5	5	7	7	70
		17"	3	0	0	0	1	3	2	2	2	2	20
		19"	0	0	0	0	0	0	0	0	0	0	0
		20"21"	0	0	0	0	1	3	0	0	0	0	0
		TTL	81	6	6	7	8	81	10	10	12	12	130

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MATSUSHITA	JAPAN	14"	0					0					0
		15"	0					0					0
		17"	2,169	120	130	130	120	1,500	10	10	10	5	105
		19"	0		5	10	15	90	10	10	10	10	120
		20"21"	465	20	20	20	20	240	10	10	10	10	120
		TTL	2,634	140	155	160	155	1,830	30	30	30	25	345
	TAIWAN	14"	36					0					0
		15"	579	70	70	70	70	840	70	60	60	60	750
		17"	0			5	10	45	20	30	30	30	330
		19"	0					0					0
		20"21"	0					0					0
		TTL	615	70	70	75	80	885	90	90	90	90	1,080
	TOTAL	14"	36	0	0	0	0	0	0	0	0	0	0
		15"	579	70	70	70	70	840	70	60	60	60	750
		17"	2,169	120	130	135	130	1,545	30	40	40	35	435
		19"	0	0	5	10	15	90	10	10	10	10	120
		20"21"	465	20	20	20	20	240	10	10	10	10	120
		TTL	3,249	210	225	235	235	2,715	120	120	120	115	1,425

HITACHI	JAPAN	14"	0					0					0
		15"	0					0					0
		17"	0					0					0
		19"	183	20	25	17	36	294	8	17	11	3	117
		20"21"	150	12	11	17	19	177	9	10	11	6	108
		TTL	333	32	36	34	55	471	17	28	21	9	225
	TAIWAN	14"	0					0					0
		15"	0					0					0
		17"	18	3	3	7	7	60	5	5	5	5	60
		19"	12	7	10	23	23	189	15	30	30	30	315
		20"21"	0					0					0
		TTL	30	10	13	30	30	249	20	35	35	35	375
	MEXICO	14"	0					0					0
		15"	0					0					0
		17"	0					0					0
		19"	0					0	10	10	10	13	130
		20"21"	0					0					0
		TTL	0					0	10	10	10	13	130
	UK	14"	0					0					0
		15"	0					0					0
		17"	0	3	4	5	5	51	5	5	5	5	60
		19"	0		2	3	5	30	5	5	5	5	60
		20"21"	0	1	1	1	1	12	2	2	2	2	24
		TTL	0	4	7	9	11	93	12	12	12	12	144
	TOTAL	14"	0	0	0	0	0	0	0	0	0	0	0
		15"	0	0	0	0	0	0	0	0	0	0	0
		17"	18	6	7	12	12	111	10	10	10	10	120
		19"	195	27	37	43	64	513	38	62	56	51	622
		20"21"	150	13	12	18	20	189	11	12	13	8	132
		TTL	363	46	56	73	96	813	59	85	78	69	873

FUJITSU	JAPAN	14"	12	1	1	1	0	9	1	1	1	1	12
		15"	219	26	9	10	1	138	1	0	0	1	6
		17"	450	28	16	24	27	285	29	12	7	8	169
		19"	0	2				6					0
		20"21"	12	1				3	0				1
		TTL	693	58	26	35	28	441	31	13	9	10	187
	TOTAL	14"	12	1	1	1	0	9	1	1	1	1	12
		15"	219	26	9	10	1	138	1	0	0	1	6
		17"	450	28	16	24	27	285	29	12	7	8	169
		19"	0	2	0	0	0	6	0	0	0	0	0
		20"21"	12	1	0	0	0	3	0	0	0	0	1
		TTL	693	58	26	35	28	441	31	13	9	10	187

IIYAMA	JAPAN	14"	0					0					0
		15"	0					0					0
		17"	426	42	33	39	30	432	19	31	23	20	277
		19"	9	9	9	9	11	114	13	9	8	6	109
		20"21"	93	8	9	9	6	96	6	5	5	5	63
		TTL	528	59	51	57	47	642	37	46	36	31	449
	UK	14"	0					0					0
		15"	0					0					0
		17"	0					0	5	4	4	3	48
		19"	0					0					0
		20"21"	0					0					0
		TTL	0	0	0	0	0	0	5	4	4	3	48
	TOTAL	14"	0	0	0	0	0	0	0	0	0	0	0
		15"	0	0	0	0	0	0	0	0	0	0	0
		17"	426	42	33	39	30	432	23	35	27	23	325
		19"	9	9	9	9	11	114	13	9	8	6	109
		20"21"	93	8	9	9	6	96	6	5	5	5	63
		TTL	528	59	51	57	47	642	42	50	40	34	497

TOTOKU		14"	3	1	1			6	1	1	1	1	6
		15"	21	2	2	1	1	14	2	2	1	1	15
		17"	54	7	7	5	5	72	4	4	4	4	48
		19"	0				2	6	1	1	1	1	12
		20"21"	42	3	3	3	3	30	1	1	1	1	6

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	JAPAN	TTL	120	12	12	8	11	128	8	8	7	7	87
		14"	3	1	1	0	0	6	1	1	1	1	6
		15"	60	2	2	1	1	14	2	2	1	1	15
		17"	69	7	7	5	5	72	4	4	4	4	48
		19"	0	0	0	0	2	6	1	1	1	1	12
		20"21"	42	3	3	3	3	30	1	1	1	1	6
	TOTAL	TTL	174	12	12	8	11	128	8	8	7	7	87

NANAO		14"	0					0					0
		15"	81	4	7	3	2	49	6	2	1	3	35
		17"	390	36	35	31	32	405	78	27	31	45	544
		19"	9	7	4	4	4	55	12	13	11	12	143
		20"21"	129	7	7	8	8	90	18	18	22	24	245
	JAPAN	TTL	609	55	53	46	46	599	113	60	65	84	966
		14"	0	0	0	0	0	0	0	0	0	0	0
		15"	81	4	7	3	2	49	6	2	1	3	35
		17"	390	36	35	31	32	405	78	27	31	45	544
		19"	9	7	4	4	4	55	12	13	11	12	143
		20"21"	129	7	7	8	8	90	18	18	22	24	245
	TOTAL	TTL	609	55	53	46	46	599	113	60	65	84	966

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SONY	JAPAN	14"	0					0					0
		15"	174	9	9	6	0	72					0
		17"	435	16	25	25	15	245	16	20	35	35	316
		19"	12	4	9	3	4	59	4	6	4	5	56
		20"21"	900	70	62	50	36	653	60	56	54	55	676
		TTL	1,521	99	105	84	55	1,029	80	81	93	95	1,048
	MEXICO	14"	0					0					0
		15"	876	61	102	47	45	766					0
		17"	1,305	163	169	120	198	1,947	150	150	173	173	1,940
		19"	0	2	5	5	45	172	20	20	30	30	300
		20"21"	93	7	9	27	28	213	10	10	13	13	140
		TTL	2,274	233	285	199	316	3,098	180	180	217	217	2,380
	UK	14"	0					0					0
		15"	237	23	11	12	11	171					0
		17"	330	43	38	33	28	426	19	20	20	19	234
		19"	0	7	10	12	13	126	17	17	18	17	207
		20"21"	60	8	8	8	9	99	15	15	15	15	180
		TTL	627	81	67	65	61	822	51	52	53	51	621
	CHINA	14"	0					0					0
		15"	75	10	4	15	2	92	2	2	2	2	24
		17"	0					91	3	3	3	3	33
		19"	0					0					0
		20"21"	0					0					0
		TTL	75	10	11	26	14	183	5	5	5	5	57
	TOTAL	14"	0	0	0	0	0	0	0	0	0	0	0
		15"	2,058	115	127	82	60	1,152	2	2	2	2	24
		17"	2,598	226	241	191	256	2,741	188	192	231	230	2,522
		19"	12	13	24	20	62	358	41	43	52	52	563
		20"21"	1,053	85	79	85	72	965	85	81	83	83	996
		TTL	5,721	439	471	378	450	5,216	315	318	368	367	4,105

NHE	CHINA	14"	0					0					0
		15"	435	67	70	75	77	867	60	70	70	90	870
		17"	0					171	20	35	35	40	390
		19"	0					0					57
		20"21"	0					0					0
		TTL	435	67	90	95	94	1,038	80	108	111	140	1,317
	MALAYSIA	14"	0					0					0
		15"	180					12	2				6
		17"	285	20	15	10	2	141	4	7	6	7	72
		19"	0	3	3	1	1	24	1	1			6
		20"21"	0					0					0
		TTL	465	23	19	12	5	177	7	8	6	7	84
	USA	14"	0					0					0
		15"	0					0					0
		17"	465	10	10	10	2	96					0
		19"	0					0	2	1			9
		20"21"	105	10	7	7	8	96	7	8			45
		TTL	570	20	17	17	10	192	9	9	0	0	54
	MEXICO	14"	0					0					0
		15"	0					0					0
		17"	0	5	15	15	20	165	20	25	25	30	300
		19"	0					6	2	6	5	6	57
		20"21"	0					0					48
		TTL	0	5	15	15	22	171	22	34	37	42	405
	TOTAL	14"	330	0	0	0	0	0	0	0	0	0	0
		15"	615	82	81	84	83	990	62	70	70	90	876
		17"	828	37	62	57	43	597	44	67	66	77	762
		19"	0	3	3	1	3	30	5	11	11	16	129
		20"21"	255	10	7	7	8	96	7	11	7	6	93
		TTL	2,028	132	153	149	137	1,713	118	159	154	189	1,860

MITSUBISHI	JAPAN	14"	0					0					0
		15"	0	3	4	6			37				0
		17"	189	9	4	8	8	86	1	11	20	20	155
		19"	0					28	10	2			36
		20"21"	390	31	22	21	22	288	10	6	12	20	143
		TTL	579	42	29	38	37	440	21	19	32	40	335
	MEXICO	14"	0					0					0
		15"	0					0					0
		17"	60	18	20	20	20	234	5	10	13		
		19"	0					0					85
		20"21"	0					0					0
		TTL	60	18	20	20	20	234	5	10	13	0	85
	TOTAL	14"	0	0	0	0	0	0	0	0	0	0	0
		15"	0	3	4	6	0	37	0	0	0	0	0
		17"	249	27	24	28	28	320	6	21	33	20	240
		19"	0	0	0	2	7	28	10	2	0	0	36
		20"21"	390	31	22	21	22	288	10	6	12	20	143
		TTL	639	60	49	58	57	674	26	29	45	40	419

MEM	MALAYSIA	14"	0					0					0
		15"	0					0					0
		17"	0	18	20	20	20	234	20	8	8	8	132
		19"	0					0					108
		20"21"	0					0					0
		TTL	0	18	20	20	20	234	20	20	20	20	240

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	14"	0	0	0	0	0	0	0	0	0	0	0
	15"	0	0	0	0	0	0	0	0	0	0	0
	17"	0	18	20	20	20	234	20	8	8	8	132
	19"	0	0	0	0	0	0	0	12	12	12	108
	20"21"	0	0	0	0	0	0	0	0	0	0	0
TOTAL	TTL	0	18	20	20	20	234	20	20	20	20	240

World Wide Monitor Production Forecast

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<SUMMARY>

TOTAL BY SIZE			PRODUCTION (KP/M)										
		'97 TTL	'98					'99					
			1Q	2Q	3Q	4Q	TTL	1Q	2Q	3Q	4Q	TTL	
	14"	21,348	1,424	1,246	1,213	1,000	14,653	787	792	782	753	9,344	
	15"	28,467	2,755	2,595	3,387	3,552	36,867	3,108	3,025	3,570	3,626	39,989	
	17"	21,561	2,104	2,283	2,892	3,261	31,622	3,284	3,051	3,711	3,940	41,955	
	19"	630	156	222	352	489	3,657	473	502	597	652	6,673	
	20"21"	3,099	205	189	205	205	2,411	192	193	201	213	2,398	
	TTL	75,105	6,645	6,535	8,049	8,508	89,210	7,843	7,563	8,862	9,184	#####	
			75,105	6,645	6,535	8,049	8,508	89,210	7,843	7,563	8,862	9,184	#####

BY REGION			'98					'99				
		'97	1Q	2Q	3Q	4Q	TTL	1Q	2Q	3Q	4Q	TTL
		TTL										
	TAIWAN	16,944	987	1,023	1,481	1,415	14,718	967	887	1,042	1,054	11,851
	KOREA	13,302	1,107	1,097	1,198	1,405	14,421	1,253	1,306	1,393	1,437	16,170
	JAPAN	7,209	497	468	462	433	5,579	336	284	293	301	3,641
	CHINA	9,171	1,372	1,395	1,844	1,994	19,815	2,223	2,177	2,668	2,801	29,609
	THAILAND	4,686	569	493	648	627	7,011	736	614	717	720	8,360
	MALAYSIA	7,470	526	466	641	680	6,939	557	509	609	644	6,958
	INDONESIA	2,778	272	220	287	275	3,166	293	282	296	320	3,570
	SINGAPORE	648	29	20	23	12	251	11	11	11	11	135
	USA	1,638	23	19	19	12	219	9	9	0	0	54
	MEXICO	5,451	708	802	809	964	9,848	842	824	1,069	1,095	11,491
	BRAZIL	456	46	68	87	83	852	54	100	151	157	1,385
	INDIA	0	0	0	0	0	0	0	0	0	0	0
	HUNGARY	801	170	180	195	215	2,280	174	190	247	250	2,580
	UK	2,631	251	202	265	289	3,021	258	242	271	308	3,236
	GERMANY	150	3	0	0	0	9	0	0	0	0	0
	TURKEY	81	6	6	7	8	81	10	10	12	12	130
	FINLAND	1,308	45	54	52	65	648	45	47	13	5	330
	PHILIPINE	381	33	22	31	31	351	77	73	68	69	860
	TOTAL	75,105	6,645	6,535	8,049	8,508	89,210	7,843	7,563	8,862	9,184	#####

75,105 6,645 6,535 8,049 8,508 89,210 7,843 7,563 8,862 9,184 #####

TOTAL BY NATIONALITY					PRODUCTION (KP/M)									
				'97	'98					'99				
				TTL	1Q	2Q	3Q	4Q	TTL	1Q	2Q	3Q	4Q	TTL
TAIWANESE	14"	12,798	866	670	690	564	8,370	389	314	303	303	3,926		
	15"	14,388	1,340	1,143	1,670	1,659	17,436	1,539	1,471	1,774	1,775	19,679		
	17"	7,845	934	1,048	1,634	1,754	16,110	1,857	1,593	2,033	2,118	22,804		
	19"	381	84	117	209	235	1,935	230	201	268	282	2,941		
	20"/21"	156	6	6	10	20	126	18	18	20	20	227		
TOTAL		35,568	3,226	2,980	4,209	4,228	43,929	4,029	3,593	4,393	4,494	49,527		
KOREAN	14"	5,460	350	332	279	221	3,546	184	224	232	205	2,534		
	15"	8,868	954	932	1,175	1,348	13,227	1,163	1,174	1,379	1,405	15,364		
	17"	4,833	489	512	544	666	6,633	750	797	938	1,058	10,629		
	19"	18	4	12	41	63	360	90	113	138	180	1,564		
	20"/21"	156	5	6	6	7	72	12	12	14	16	161		
TOTAL		19,335	1,802	1,794	2,045	2,305	23,838	2,199	2,320	2,700	2,865	30,252		
ASEAN	14"	897	48	59	67	43	655	22	23	33	39	350		
	15"	642	44	53	66	57	660	25	29	40	48	427		

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		17"	351	11	14	16	32	219	23	28	33	43	384	
		19"	0	0	2	3	10	45	10	10	20	20	180	
		20"/21"	90	8	8	8	7	93	8	8	8	8	96	
	TOTAL		1,980	111	136	160	149	1,672	88	98	135	159	1,437	
	CHINA	14"	1,623	150	175	168	163	1,968	183	223	206	200	2,435	
		15"	660	105	157	209	257	2,184	225	201	231	231	2,665	
		17"	279	32	30	70	113	735	128	99	136	156	1,556	
		19"	0	0	0	0	0	0	0	2	2	3	22	
		20"/21"	0	0	0	0	0	0	0	0	0	0	0	
	TOTAL		2,562	291	366	451	537	4,935	539	529	579	594	6,728	
	JAPANESE	14"	474	2	2	1	0	15	2	2	2	2	18	
		15"	3,612	301	299	256	217	3,219	142	136	134	157	1,706	
		17"	7,197	547	575	542	583	6,743	432	416	457	460	5,296	
		19"	225	61	82	89	168	1,200	129	163	161	160	1,841	
		20"/21"	2,589	178	159	171	158	1,997	146	145	152	157	1,799	
	TOTAL		14,097	1,089	1,116	1,059	1,127	13,174	851	861	906	935	10,660	
	EUROPEAN	14"	96	8	8	8	9	99	8	8	6	5	81	
		15"	297	11	11	11	14	141	14	14	12	9	148	
		17"	1,056	91	104	86	113	1,182	93	117	113	105	1,285	
		19"	6	7	9	10	13	117	13	13	8	7	125	
		20"/21"	108	8	10	10	13	123	8	10	8	12	115	
	TOTAL		1,563	125	142	125	162	1,662	137	162	149	137	1,754	
	GRAND TOTAL			75,105	6,645	6,535	8,049	8,508	89,210	7,843	7,563	8,862	9,184	#####

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21,348	1,424	1,246	1,213	1,000	14,653	787	792	782	753	9,344
28,467	2,755	2,595	3,387	3,552	36,867	3,108	3,025	3,570	3,626	39,989
21,561	2,104	2,283	2,892	3,261	31,622	3,284	3,051	3,711	3,940	41,955
630	156	222	352	489	3,657	473	502	597	652	6,673
3,099	205	189	205	205	2,411	192	193	201	213	2,398
75,105	6,645	6,535	8,049	8,508	89,210	7,843	7,563	8,862	9,184	#####
	6,645	6,535	8,049	8,508	89,210	7,843	7,563	8,862	9,184	#####

TOTAL BY REGION				PRODUCTION (KP/M)									
			'97	'98					'99				
			TTL	1Q	2Q	3Q	4Q	TTL	1Q	2Q	3Q	4Q	TTL
	TAIWAN		16,944	987	1,023	1,481	1,415	14,718	967	887	1,042	1,054	11,851
	KOREA		13,302	1,107	1,097	1,198	1,405	14,421	1,253	1,306	1,393	1,437	16,170
	JAPAN		7,209	497	468	462	433	5,579	336	284	293	301	3,641
	CHINA		9,171	1,372	1,395	1,844	1,994	19,815	2,223	2,177	2,668	2,801	29,609
	THAILAND		4,686	569	493	648	627	7,011	736	614	717	720	8,360
	MALAYSIA		7,470	526	466	641	680	6,939	557	509	609	644	6,958
	INDONESIA		2,778	272	220	287	275	3,166	293	282	296	320	3,570
	SINGAPORE		648	29	20	23	12	251	11	11	11	11	135
	USA		1,638	23	19	19	12	219	9	9	0	0	54
	MEXICO		5,451	708	802	809	964	9,848	842	824	1,069	1,095	11,491
	BRAZIL		456	46	68	87	83	852	54	100	151	157	1,385
	INDIA		0	0	0	0	0	0	0	0	0	0	0
	HUNGARY		801	170	180	195	215	2,280	174	190	247	250	2,580
	UK		2,631	251	202	265	289	3,021	258	242	271	308	3,236
	GERMANY		150	3	0	0	0	9	0	0	0	0	0
	TURKEY		81	6	6	7	8	81	10	10	12	12	130
	FINLAND		1,308	45	54	52	65	648	45	47	13	5	330
	PHILIPINE		381	33	22	31	31	351	77	73	68	69	860
	TOTAL		75,105	6,645	6,535	8,049	8,508	89,210	7,843	7,563	8,862	9,184	#####

VERTICAL RATE	37,557	3,240	3,362	3,761	4,026	43,170	3,557	3,683	4,297	4,415	47,854
	50.0%	48.8%	51.5%	46.7%	47.3%	48.4%	45.4%	48.7%	48.5%	48.1%	47.7%

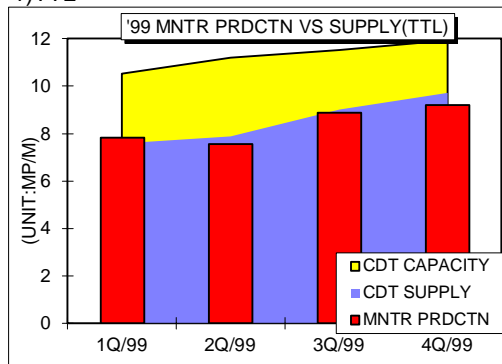
	75,105	6,645	6,535	8,049	8,508	89,210	7,843	7,563	8,862	9,184	#####
	97TTL	981Q	2Q	3Q	4Q	98TTL	991Q	2Q	3Q	4Q	99TTL
99 TOP10 Makers	40,401	3,594	3,613	4,313	4,676	48,590	4,330	4,283	5,273	5,453	58,018
	54%	54%	55%	54%	55%	54%	55%	57%	60%	59%	58%
98TOP10Makeers		3,692	3,702	4,447	4,716	49,673					
		56%	57%	55%	55%	56%					

2/15/2023

99 MONITOR PRDCTN VS CDT SUPPLY BY SIZE/BY QUARTEI

AS OF July '99 WW-MTG

1)TTL

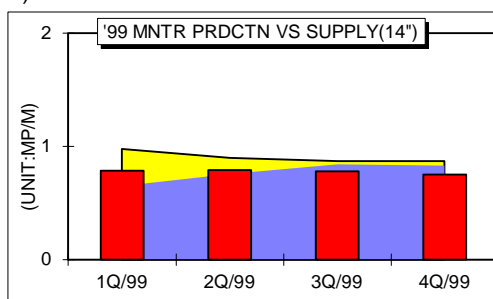


	1Q/99	2Q/99	3Q/99	4Q/99	99TTL
MNTR PRDCTN	7.8	7.6	8.9	9.2	100.4
CDT SUPPLY	7.6	7.9	9.0	9.7	102.6
CDT CAPACITY	10.5	11.2	11.5	11.9	135.4

MNTR VS	-0.3	0.3	0.1	0.5	2.3
CDT SUPPLY	97%	105%	101%	106%	102%

MNTR VS	2.7	3.6	2.7	2.7	35.0
CDT CAPA	134%	148%	130%	130%	135%

2)14"

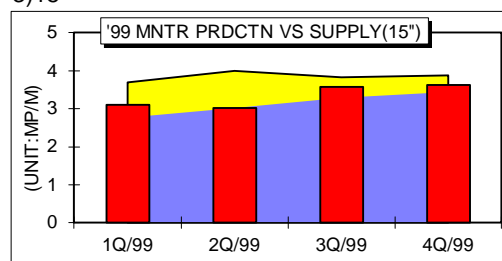


	1Q/99	2Q/99	3Q/99	4Q/99	99TTL
MNTR PRDCTN	0.8	0.8	0.8	0.8	9.3
CDT SUPPLY	0.7	0.8	0.8	0.8	9.2
CDT CAPACITY	1.0	0.9	0.9	0.9	10.9

MNTR VS	-0.1	0.0	0.1	0.1	-0.1
CDT SUPPLY	83%	96%	108%	110%	99%

MNTR VS	0.2	0.1	0.1	0.1	1.5
CDT CAPA	125%	114%	112%	116%	117%

3)15"

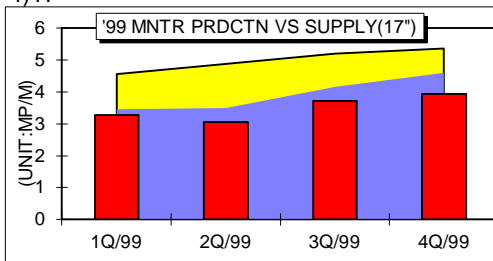


	1Q/99	2Q/99	3Q/99	4Q/99	99TTL
MNTR PRDCTN	3.1	3.0	3.6	3.6	40.0
CDT SUPPLY	2.8	3.0	3.3	3.4	37.5
CDT CAPACITY	3.7	4.0	3.8	3.9	46.2

MNTR VS	-0.3	0.0	-0.3	-0.2	-2.4
CDT SUPPLY	89%	100%	92%	95%	94%

MNTR VS	0.6	1.0	0.3	0.3	6.2
CDT CAPA	119%	132%	107%	107%	116%

4)17"

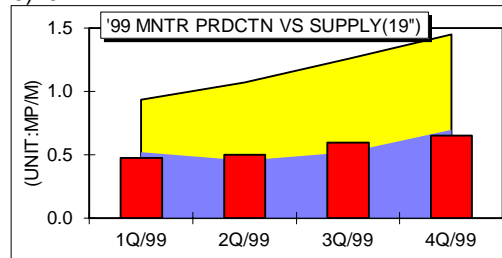


	1Q/99	2Q/99	3Q/99	4Q/99	99TTL
MNTR PRDCTN	3.3	3.1	3.7	3.9	42.0
CDT SUPPLY	3.5	3.5	4.2	4.6	47.1
CDT CAPACITY	4.6	4.9	5.2	5.4	60.0

MNTR VS	0.2	0.4	0.4	0.6	5.2
CDT SUPPLY	105%	115%	112%	116%	112%

MNTR VS	1.3	1.8	1.5	1.4	18.0
CDT CAPA	139%	160%	140%	136%	143%

5)19"



	1Q/99	2Q/99	3Q/99	4Q/99	99TTL
MNTR PRDCTN	0.5	0.5	0.6	0.7	6.7
CDT SUPPLY	0.5	0.5	0.5	0.7	6.6
CDT CAPACITY	0.9	1.1	1.3	1.5	14.1

MNTR VS	0.0	0.0	-0.1	0.0	-0.1
CDT SUPPLY	110%	91%	88%	107%	99%

MNTR VS	0.5	0.6	0.7	0.8	7.5
CDT CAPA	197%	213%	211%	222%	212%

1999 CDT Capacity & Supply comparison vs.previous survey(Jan./99)

		Capacity			Changed Points in Capacity	Supply			
		Previous	This time	Diff.		Previous	This time	Diff.	
Toshiba	15"	4,110	3,690	(420)	Japan 15" stop in 2Q TDD's plan reviewed	4,068	3,618	(450)	Japan 15" Stop in 2Q
	17"	3,900	3,735	(165)		3,600	3,576	(24)	
	19"	945	945	0		840	750	(90)	
	TTL	8,955	8,370	(585)		8,508	7,944	(564)	
Mitsubishi	17"	2,730	2,730	0		2,610	2,340	(270)	
	19"	600	600	0		450	450	0	
	TTL	4,050	4,050	0		3,300	3,045	(255)	
Sony	15"	2,160	2,160	0		480	480	0	
	17"	3,360	3,360	0		2,649	2,649	0	
	19"	2,640	2,640	0		1,425	1,425	0	
	TTL	9,360	9,360	0		5,649	5,649	0	
Hitachi	15"	735	735	0	Japan 17" stop in 3Q	735	369	(366)	Japan 17" Stop in 3Q
	17"	11,505	10,065	(1,440)		4,845	4,326	(519)	
	19"	3,000	3,000	0		2,805	2,250	(555)	
	TTL	16,440	15,000	(1,440)		9,240	7,545	(1,695)	
MEC	14"	1,680	1,680	0		450	90	(360)	BMCC Prod. Stop in 3Q
	15"			0				0	
	17"	5,700	5,700	0		3,720	3,015	(705)	
	19"	1,980	1,980	0		1,440	1,290	(150)	
	TTL	10,080	10,080	0		5,910	4,461	(1,449)	
NEC	15"	120	120	0		120	120	0	
	17"	4,440	4,440	0		3,300	3,255	(45)	
	19"	240	240	0		105	96	(9)	
	TTL	4,800	4,800	0		3,525	3,471	(54)	
Chungwah	14"	3,720	2,820	(900)	UK 1 line 14"/15"-->15"/17"(no CDT production) -0.9Mil. M'sia 1 line not shifted to 17" +0.9Mil. Yangmei 1 line 15"-->15"/17"combi. 3Q -0.3Mil. UK 1 line 14"/15"-->15"/17"(no CDT production) +0.9Mil.	2,670	2,517	(153)	
	15"	13,500	14,100	600		9,840	10,320	480	
	17"	9,609	10,989	1,380		9,540	9,171	(369)	
	19"	420	393	(27)		390	303	(87)	
	TTL	27,249	28,302	1,053		22,440	22,311	(129)	
Philips	14"	840	840	0		840	840	0	
	15"	5,550	5,550	0		4,860	5,010	150	
	17"	3,720	3,720	0		3,699	3,699	0	
	19"	510	429	(81)		510	429	(81)	
	TTL	10,620	10,539	(81)		9,909	9,978	69	
Samsung	14"	4,095	3,990	(105)	M'sia CPT-->15"(0.5Line) + 14"-->14"/15" 2Q +0.8M Suwon 15"-->17" 1Q 0.6Mil + China new 3Q 0.3Mil Pusan 20"/21"CPT-->19" 2Q	2,895	3,105	210	Suwon +0.5mil,China +0.3m Pusan 1 line 2Q
	15"	8,025	8,775	750		7,905	7,665	(240)	
	17"	7,170	8,205	1,035		7,065	7,830	765	
	19"	1,440	2,460	1,020		1,320	1,920	600	
	TTL	21,090	23,790	2,700		19,245	20,580	1,335	
LG	14"	975	375	(600)	Changwon 14"-->17" 2Q more 17" and less 15" at Gumi 15",17"combi.line Changwon 14"-->17" 2Q +0.6mil. Capa.reviewed according to actual prod.	900	300	(600)	
	15"	6,315	5,565	(750)		5,550	5,460	(90)	
	17"	5,310	6,000	690		4,911	5,760	849	
	19"	600	990	390		495	870	375	
	TTL	13,200	12,930	(270)		11,856	12,390	534	
OEC	14"	3,030	1,680	(1,350)	MEX more 15" less 14" -0.4mil Gumi 1 line 14"-->14"/15"MNN. -0.9mil. MEX +0.4Mil,Gumi +0.7Mil(MNN.) Gumi 1 line 20"/21"CPT-->17" +0.7Mil	2,805	1,065	(1,740)	
	15"	3,015	4,155	1,140		2,955	4,050	1,095	
	17"	825	1,800	975		606	1,749	1,143	
	TTL	6,870	7,635	765		6,366	6,864	498	
G-Total	14"	14,340	11,385	(2,955)	14"-->17" -1.5Mil. shift to 14",15" combi.line -0.9Mil. more 15" less 14" in production plan -0.4Mil shift from CPT,14" +1.5Mil. New Line +0.3Mil. shift from CPT +0.7Mil.,from 14" +0.6Mil., from 15"+0.6Mil.,14"/15"-->15"/17" +0.9Mil. shift from CPT +1Mil. Capacity reviewed +0.3Mil.	10,560	7,917	(2,643)	
	15"	43,530	44,850	1,320		36,513	37,092	579	
	17"	58,269	60,744	2,475		46,545	47,370	825	
	19"	12,375	13,677	1,302		9,780	9,783	3	
	TTL	#####	134,856	2,142		#####	104,238	(1,710)	

CDT CAPA			(Kp/M)				(Kp/99)	
	4Q/98	98Total	1Q/99	2Q	3Q	4Q	99Total	
14"	1,555	24,210	980 1,045	900 980	875 920	875 850	10,890 11,385	
15"	3,530	44,073	3,690 3,670	3,985 3,845	3,835 3,730	3,885 3,705	46,185 44,850	
17"	4,295	43,677	4,560 4,660	4,878 4,898	5,200 5,315	5,355 5,375	59,979 60,744	
19"	755	6,435	934 934	1,070 1,050	1,260 1,255	1,450 1,320	14,142 13,677	
20"/21"	350	4,230	350 350	350 350	350 350	350 350	4,200 4,200	
Total	10,485	122,625	10,514 10,659	11,183 11,123	11,520 11,570	11,915 11,600	135,396 134,856	100%

CDT Supply								
	4Q/98	98Total	1Q/99	2Q	3Q	4Q	99Total	
14"	1,150	16,767	650 780	758 646	842 632	831 581	9,243 7,917	SDD +0.7Mil(China 0.5,M'sia 0.2) LG Korea +0.5Mil.
15"	2,944	33,516	2,772 2,850	3,019 3,069	3,290 3,210	3,435 3,235	37,548 37,092	SDD +0.8Mil(Korea +0.6,M'sia +0.3) Sony Jpn +0.5Mil
17"	3,287	29,748	3,464 3,449	3,496 3,481	4,158 4,255	4,586 4,605	47,112 47,370	Chungwah M'sia +0.5Mil,LG Korea +0.5Mil. Chungwah ▲0.8Mil(M'sia ▲0.7) HEDS ▲0.6Mil, OEC Korea ▲0.5Mil
19"	493	3,651	519 543	455 603	523 985	695 1,130	6,576 9,783	Hitachi ▲0.8Mil,TSB▲0.4,Sony ▲0.5 SDD ▲0.6,LG ▲0.3
20"/21"	228	2,682	177 167	176 175	178 205	178 205	2,127 2,256	(258) (3,207) (129)
Total	8,102	86,364	7,582 7,789	7,904 7,974	8,991 9,287	9,725 9,756	102,606 104,418	98%

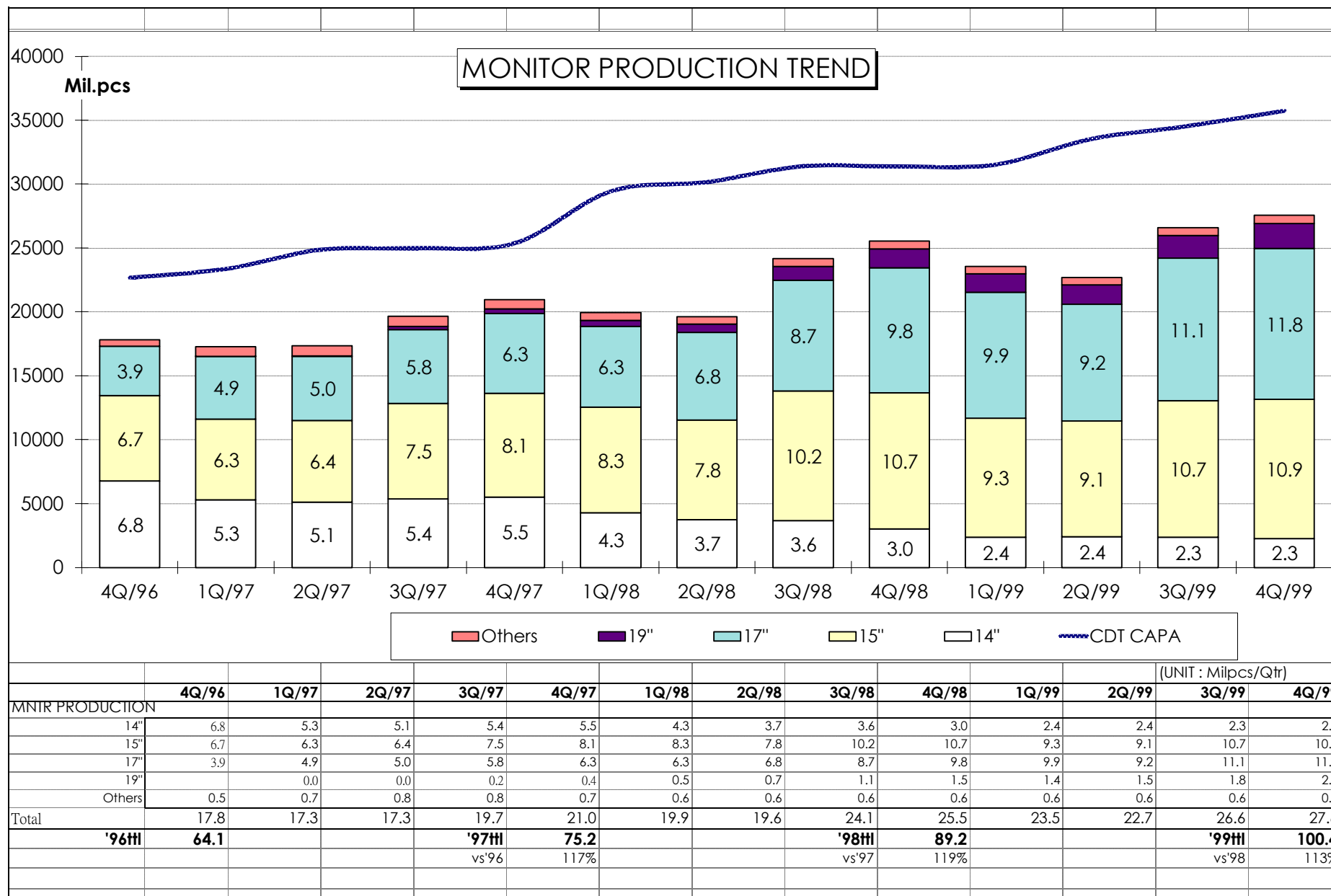
Mntr Production								
	4Q/98	98Total	1Q/99	2Q	3Q	4Q	99Total	
14"	1,000	14,653	787 711	792 642	782 701	753 730	9,344 8,356	AOC +0.7Mil,Daewoo +0.3Mil.
15"	3,552	36,867	3,108 3,184	3,025 3,080	3,570 3,491	3,626 3,601	39,989 40,066	LG ▲0.6Mil,Samsung +0.4Mil
17"	3,261	31,622	3,284 3,333	3,051 3,155	3,711 3,716	3,940 3,863	41,955 42,200	Acer ▲0.4Mil,ADI ▲0.3, Hyundai▲0.3 Matsushita ▲ 0.2,LG +0.5Mil,Lite On +0.4
19"	489	3,657	473 478	502 528	597 724	652 791	6,673 7,563	Taiwanese(PH, MAG,ADI etc) ▲0.7Mil, LG ▲0.2Mil
20"/21"	205	2,411	192 199	193 200	201 208	213 231	2,398 2,516	(245) (890) (118)
Total	8,507	89,210	7,844 7,905	7,563 7,605	8,861 8,840	9,184 9,216	100,359 100,701	Taiwanese▲0.4Mil (ADI▲0.4,Shamrock▲0.4,Jean ▲ 0.2 Lite On +0.6) 99.7% S/S +0.9,Hyundai▲0.4, Matsushita ▲0.5

CAPA VS. Supply			small font=previous(Apr/99) survey					
	4Q/98	98Total	1Q/99	2Q	3Q	4Q	99Total	
14"	74%	69%	66% 75%	84% 66%	96% 69%	95% 68%	85% 70%	
15"	83%	76%	75% 78%	76% 80%	86% 86%	88% 87%	81% 83%	
17"	77%	68%	76% 74%	72% 71%	80% 80%	86% 86%	79% 78%	
19"	65%	57%	56% 58%	43% 57%	42% 78%	48% 86%	46% 72%	
20"/21"	65%	63%	51% 48%	50% 50%	51% 59%	51% 59%	51% 54%	
Total	77%	70%	72% 73%	71% 72%	78% 80%	82% 84%	76% 77%	

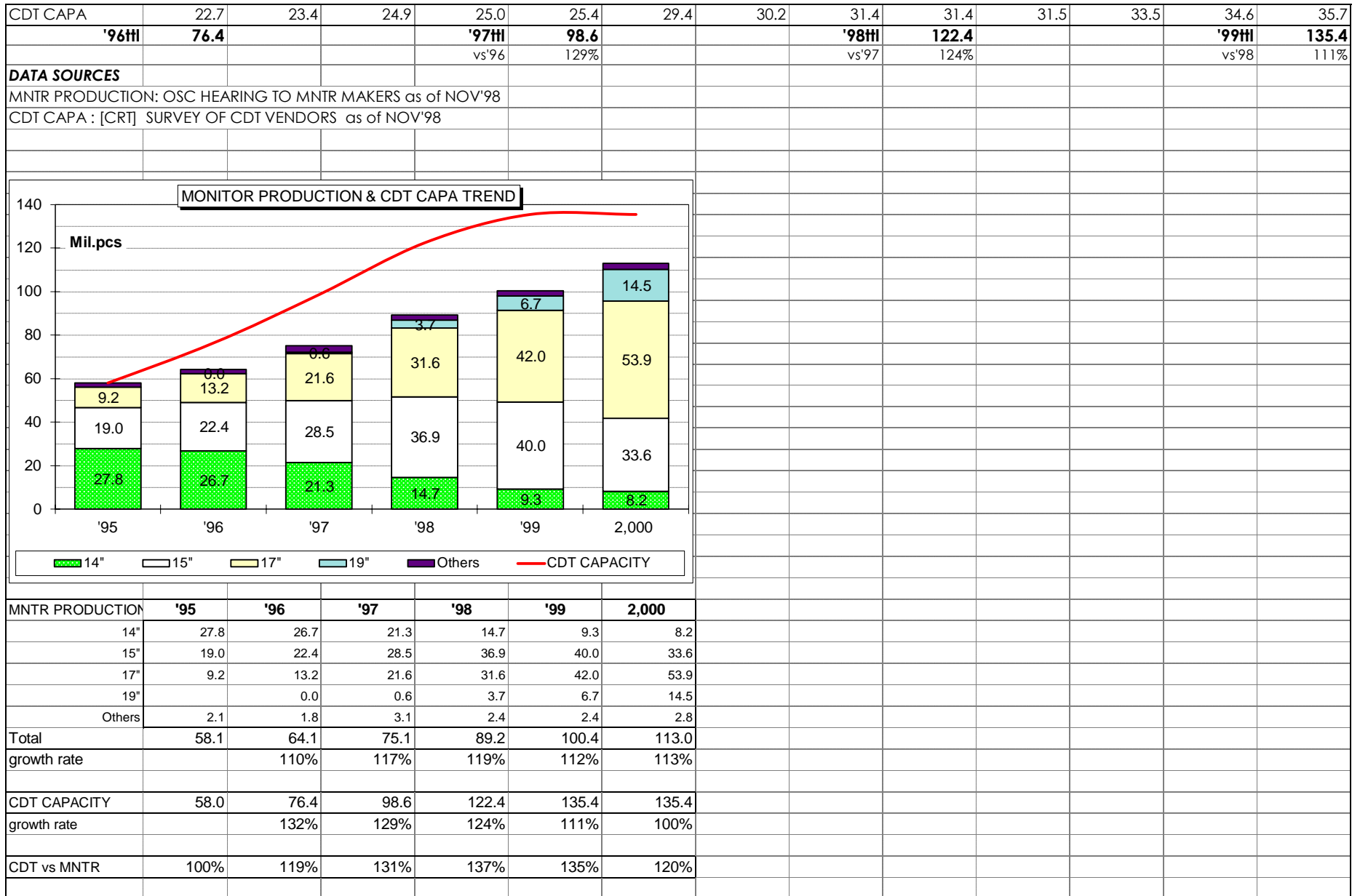
CAPA VS.Mntr Prod								
	4Q/98	98Total	1Q/99	2Q	3Q	4Q	99Total	
14"	156%	165%	125% 147%	114% 153%	112% 131%	116% 116%	117% 136%	
15"	99%	120%	119% 115%	132% 125%	107% 107%	107% 103%	115% 112%	
17"	132%	138%	139% 140%	160% 155%	140% 143%	136% 139%	143% 144%	
19"	154%	176%	197% 195%	213% 199%	211% 173%	222% 167%	212% 181%	
20"/21"	171%	175%	182% 176%	181% 175%	174% 168%	164% 152%	175% 167%	
Total	123%	137%	134% 135%	148% 146%	130% 131%	130% 126%	135% 134%	

Supply VS.Mntr Prod								
	4Q/98	98Total	1Q/99	2Q	3Q	4Q	99Total	
14"	115%	114%	83% 110%	96% 101%	108% 90%	110% 80%	99% 95%	
15"	83%	91%	89% 90%	100% 100%	92% 92%	95% 90%	94% 93%	
17"	101%	94%	105% 103%	115% 110%	112% 115%	116% 119%	112% 112%	
19"	101%	100%	110% 114%	91% 114%	88% 136%	107% 143%	99% 129%	
20"/21"	111%	111%	92% 84%	91% 88%	89% 99%	84% 89%	89% 90%	
Total	95%	97%	97% 99%	105% 105%	101% 105%	106% 106%	102% 104%	

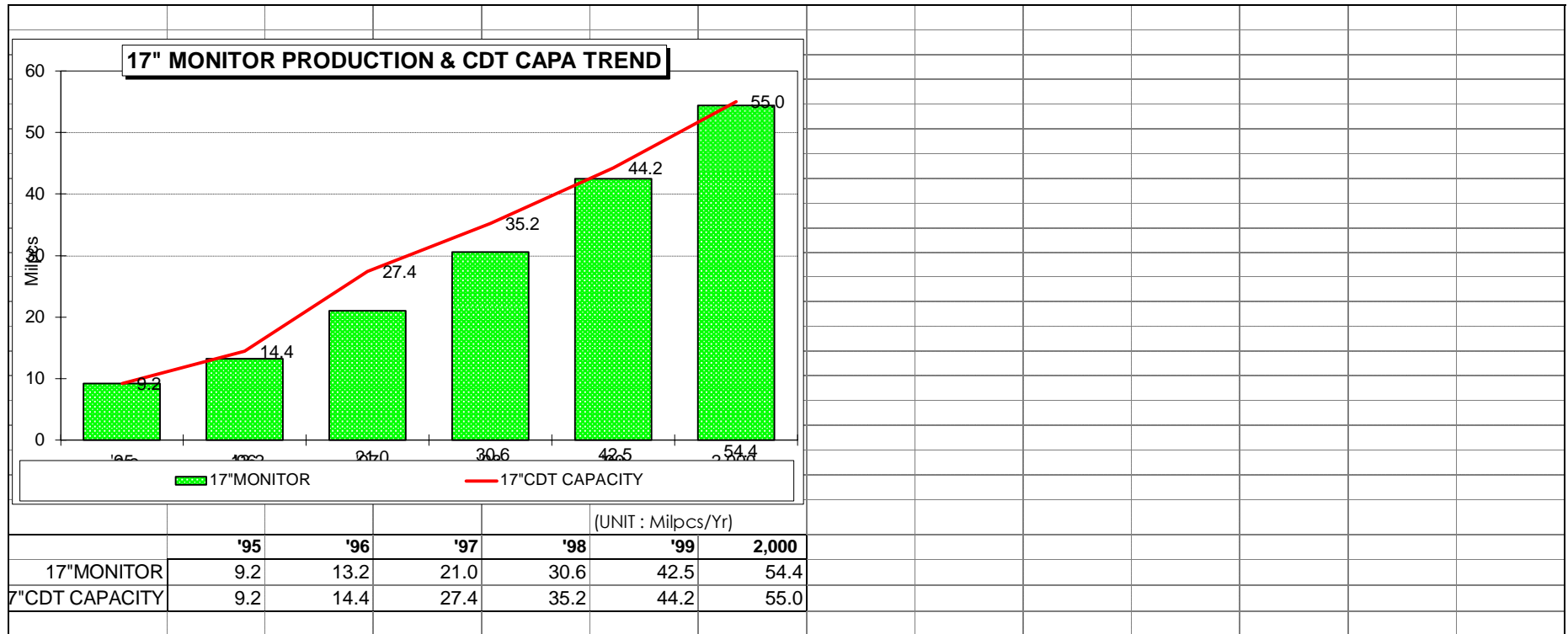
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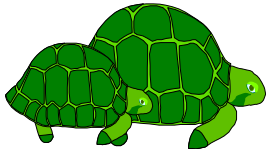


2/15/2023



CDT & MONITOR DEMAND SUPPLY ANALYSIS

as of July 1999



TOSHIBA

CRT Sales & Marketing Dept.
Electronic Devices Sales & Marketing Group

Topics of this times' Analysis

*CDT Demand & Supply

CDT supply is well balanced or even tight.

But CDT capacity is much excess(135% in 99) vs CDT demand ==>> CDT supply can be easily increased, if necessary.

<<1999 outlook by size>>

19": Even fct decreased from last survey, still 6.7Mil is expected by MNTr Makers.

1H : 2H ratio = 44% : 56%, Many are expecting more in 2H than 1H.

Need to watch situation continuously.

As for Supply/Demand, Looks tight at a glance, however, we see the same volume both in 3Q & 4Q by Japanese CDT supplier. In case Japanese supplier decide to increase in 2H, over supply situation will easily occur.

==>> CDT capacity is much excess(212%=more than twice) vs CDT demand !

17": Demand expanding from 1998 but over supply situation continues.

As for Supply/Demand, around 12% gap in 3Q & 16% gap in 4Q exists.

15": Becoming more tight from 3Q onwards.

CDT supplier might have a chance to success of pricing up.

14": Both CDT supply & MNTr production increased compared with last survey.

From 3Q onwards, CDT supply seems to be well balanced.

* Monitor production

- '99 Monitor production plan = 100.4 mil. 13% increase from '98

	98	99		
	Actual	Previous	This Time	Growth
14"	14.7	8.4	9.3	63%
15"	36.9	40.1	40.0	108%
17"	31.6	42.2	42.0	133%
19"	3.7	7.6	6.7	181%
20"/21"	2.4	2.5	2.4	100%
Total	89.2	100.7	100.4	113%

		1H/98	2H/98	98Total	1H/99	2H/99	99Total
CDT Supply	All Size	47.6%	52.4%	100%	45.3%	54.7%	100%
	19"	35.7%	64.3%	100%	44.4%	55.6%	100%
Monitor Prod.	All Size	44.3%	55.7%	100%	46.0%	54.0%	100%
	19"	31.0%	69.0%	100%	43.9%	56.1%	100%
Share	Vertical Integrated	50.1%	47.0%	48.4%	47.0%	48.3%	47.7%
Share	Top 10 Makers(all size)	56.1%	55.3%	55.7%	55.9%	59.4%	57.8%
	Top 10 Makers (19")			72.7%	59.3%	60.5%	60.0%

*CDT New Production lines (1 line) & Shifts(from CPT & within CDT)

New

SDD Shenzhen 1 line 14"(2/3) + 17"(1/3) MP starts 3Q/99

SDD Tianjing 1 line 15"(& 14") 2Q

Shift from CPT

SDD M'sia 0.5 line -->17" 2Q/99

OEC Gumi 1 line -->17" 2Q/99

SDD Pusan 1 line -->19" Jun-99

Size Change

14"-->17" CPT M'sia 2 lines 1 line 1Q + 1 line 2Q

15"-->17" CPT Yangming 1 line 3Q

15" MNN. 99/1Q 2Q 3Q 4Q (Prod. Lines)

TSB	Jpn/Thai	2.5	2	2	2
SDD	Suwon	1	1	1	1
	Pusan	1	1	1	1
	M'sia	0	1	1	1
CPT		0	1	1	1
OEC	Gumi	0	1	1	1
LG	Gumi		TBC	TBC	TBC
Total		4.5	7	7	7

* CDT Production

- 4 New Lines production starts in 4Q/98-'99 (+8mil/'99)

Samsung: China 1 line for 15" from 2Q/99

LG : Changwon 1 line for 15" 4Q/98

Hitachi: Mobara 1 line for 19" in 4Q/98

Toshiba: TDDT x0.5 15", TDD x0.5 17" in 4Q/98

Non-Japanese CDT makers are accelerating to shift from 14"/ 15" to 17"

LG is being said to produce over 400Kp/M of 17" in 4Q/98

TECO will have 200Kp/M of 17" production capacity in Taiwan by end/98

PHILIPS is going to have 300Kp/M of 17" capacity in Taiwan next year

Some CDT production lines has been stopped

- Lines stopped for Production adjustment.

HEDS S'Pore: 15"x2lines stopped. 3 lines operating.
SDD Pusan: One 14" line shut down for
transfer to Mexico, but plan suspended.
Philips : 14"x1, 15"x1 total 2 lines stopped.
12lines operating.
MEC JPN: 17"x1 line stopped
Sony JPN: 17"x1 line stopped
NEC JPN: 17"x1 line stopped

- Korean new CDT lines suspended.

ex) SDD: Brazil, Mexico, Tianjin
LG: China, UK, USA
OEC: Mexico

		1H/98	2H/98	98Total	1Q/99	2Q/99	1H/99	3Q/99	4Q/99	2H/99	99Total
CDT Supply	All Size	47.6%	52.4%	100%	22.2%	23.1%	45.3%	26.3%	28.4%	54.7%	100%
	19"	35.7%	64.3%	100%	23.6%	20.8%	44.4%	23.9%	31.7%	55.6%	100%
Monitor Proc	All Size	44.3%	55.7%	100%	23.4%	22.6%	46.0%	26.5%	27.5%	54.0%	100%
	19"	31.0%	69.0%	100%	21.3%	22.6%	43.9%	26.8%	29.3%	56.1%	100%
	Share										
	Vertical Integrated	50.1%	47.0%	48.4%	45.4%	48.7%	47.0%	48.5%	48.1%	48.3%	47.7%
	Share										
	Top 10 Makers(all siz	56.1%	55.3%	55.7%	55.2%	56.6%	55.9%	59.5%	59.4%	59.4%	57.8%
	Top 10 Makers (19")			72.7%	58.8%	59.8%	59.3%	60.8%	60.2%	60.5%	60.0%

Trend by Quarter

EXHIBIT 32

'01 WW Monitor Production Ranking (Fcst)

24-Apr-01

(vs.Feb forecast)

[UNIT:KP/Yr]

'99 Ranking

ALL	Company	Q'ty	Share
→1	SAMSUNG	23,103	19.8%
→2	TOP VICTORY	11,658	10.0%
→3	LG	11,622	9.9%
→4	PHILIPS	10,881	9.3%
→5	LITE-ON	6,081	5.2%
→6	ACER	5,340	4.6%
→7	ESSEX	5,136	4.4%
9 ↑ 8	NMV	4,287	3.7%
8 ↓ 9	DELTA	3,903	3.3%
↑ 10	SONY	2,982	2.6%
Top 10 Total		84,993	72.8%
Others		31,831	27.2%
TOTAL		116,823	100.0%

14"	Company	Q'ty	Share
→1	TOP VICTORY	1,890	34.0%
→2	SAMSUNG	984	17.7%
8 ↑ 3	ESSEX	420	7.6%
7 ↑ 4	CGC	330	5.9%
4 ↓ 5	JEAN	330	5.9%
5 ↓ 6	ACER	279	5.0%
6 ↓ 7	PHILIPS	273	4.9%
↑ 8	LIKOM	210	3.8%
3 ↓ 9	TATUNG	210	3.8%
↑ 10	ASKA	120	2.2%
Top 10 Total		5,046	90.7%
Others		516	9.3%
TOTAL		5,562	100.0%

15"	Company	Q'ty	Share
→1	SAMSUNG	6,990	21.0%
→2	TOP VICTORY	3,540	10.6%
→3	LG	3,252	9.8%
→4	PHILIPS	2,598	7.8%
→5	ACER	2,415	7.3%
8 ↑ 6	ESSEX	1,560	4.7%
→7	DELTA	1,530	4.6%
10 ↑ 8	JEAN	1,170	3.5%
6 ↓ 9	LITE-ON	1,050	3.2%
9 ↓ 10	SHAMROCK	900	2.7%
Top 10 Total		25,005	75.1%
Others		8,300	24.9%
TOTAL		33,305	100.0%

ALL	Company	Q'ty
1	Samsung	12,381
2	Philips	9,439
3	LG	8,333
4	Top Victory	5,002
5	Acer	4,604
6	Sony	4,502
7	Essex	4,350
8	Daewoo	3,940
9	Lite-on	3,493
10	Jean	3,360
11	Delta	3,302

14"	Company	Q'ty
1	Top Victory	1,590
2	Samsung	1,030
3	Philips	998
4	Jean	860
5	Essex	700
6	LG	678
7	Acer	410
8	ADI	275
9	Lite-on	255
10	Xococo	255
11	Likom	255
12	Orion	220
13	TVM	200
14	CGC	200
15	Hyundai	158

15"	Company	Q'ty
1	Samsung	5,839
2	LG	4,525
3	Philips	3,390
4	Daewoo	2,930
5	Acer	2,180
6	Top Victory	2,170
7	Delta	2,020
8	Essex	1,790
9	Jean	1,570
10	ADI	1,380
11	Tatung	1,330
12	Compal	1,250

17"	Company	Q'ty	Share
→1	SAMSUNG	13,755	21.4%
→2	LG	7,146	11.1%
→3	PHILIPS	6,765	10.5%
5 ↑ 4	TOP VICTORY	5,355	8.3%
4 ↓ 5	LITE-ON	4,530	7.0%
8 ↑ 6	ESSEX	2,655	4.1%
→7	ACER	2,550	4.0%
10 ↓ 8	DELTA	1,920	3.0%
6 ↓ 9	NMV	1,770	2.7%
↑ 10	SAMPO	1,608	2.5%
Top 10 Total		48,054	74.7%
Others		16,313	25.3%
TOTAL		64,367	100.0%

19"	Company	Q'ty	Share
2 ↑ 1	SAMSUNG	1,356	12.3%
1 ↓ 2	PHILIPS	1,125	10.2%
6 ↑ 3	NMV	1,125	10.2%
→4	LG	1,101	10.0%
→5	TOP VICTORY	873	7.9%
3 ↓ 6	SONY	745	6.8%
↑ 7	ESSEX	501	4.5%
↑ 8	LITE-ON	501	4.5%
8 ↓ 9	KDS	495	4.5%
↑ 10	DELTA	453	4.1%
Top 10 Total		8,275	75.0%
Others		2,766	25.0%
TOTAL		11,041	100.0%

20/21"	Company	Q'ty	Share
→1	SONY	1,081	42.4%
→2	NMV	630	24.7%
→3	KDS	180	7.1%
5 ↑ 4	IYAMA	137	5.4%
4 ↓ 5	PHILIPS	120	4.7%
→6	LG	90	3.5%
↑ 7	COMPAL	78	3.1%
→8	NANAO	59	2.3%
→9	DAEWOO	42	1.6%
→10	ACER	36	1.4%
Top 10 Total		2,453	96.2%
Others		96	3.8%
TOTAL		2,549	100.0%

17"	Company	Q'ty
1	Samsung	5,036
2	Philips	4,440
3	Sony	2,600
4	LG	2,562
5	Lite-on	2,035
6	Acer	1,870
7	Essex	1,670
8	Nokia	1,385
9	Magtech	1,367
10	Royal	1,320
11	Chuntex	1,275
12	Top Victory	1,206
13	Cape	1,140
14	ADI	1130
15	KDS	1054
16	Delta	995

19"	Company	Q'ty
1	Sony	967
2	LG	543
3	Philips	465
4	Samsung	418
5	Hitachi	372
6	Cape	345
7	Royal	310
8	KDS	263
9	ADI	220
10	Sampo	200
11	Essex	190
12	Delta	157
13	Acer	145
14	Iiyama	143

20/21"	Company	Q'ty
1	Sony	869
2	Matsushita	183
3	Mitsubishi/NHE	174
4	Hitachi	156
5	Philips	146
6	Nokia	115
7	Stesa	96
8	Iiyama	82
9	Cape	80
10	Nanao	90
11	KDS	51
12	Samsung	50

'00 WW Monitor Production Ranking

26-Apr-01

Remark: () = '99 Ranking

[UNIT:KP/Yr]

'99 Ranking

ALL	Company	Q'ty	Share
1 (1)	SAMSUNG	19,038	16.6%
2 (3)	LG	10,102	8.8%
3 (4)	TOP VICTORY	9,586	8.3%
4 (2)	PHILIPS	8,970	7.8%
5 (9)	LITE-ON	5,165	4.5%
6 (6)	SONY	4,719	4.1%
7 (5)	ACER	4,476	3.9%
8 (-)	NMV	4,192	3.6%
9 (7)	ESSEX	4,061	3.5%
10 (11)	DELTA	4,029	3.5%
Top 10 Total		74,337	64.7%
Others		40,548	35.3%
TOTAL		114,886	100.0%

14"	Company	Q'ty	Share
1 (1)	TOP VICTORY	2,341	28.8%
2 (2)	SAMSUNG	1,167	14.4%
3 (4)	JEAN	1,056	13.0%
4 (5)	ESSEX	636	7.8%
5 (3)	PHILIPS	525	6.5%
6 (7)	ACER	330	4.1%
7 (14)	CGC	300	3.7%
8 (10)	XOCECO	234	2.9%
9 (-)	FOUNDER	206	2.5%
10 (-)	ASKA	182	2.2%
Top 10 Total		6,977	85.8%
Others		1,150	14.2%
TOTAL		8,127	100.0%

15"	Company	Q'ty	Share
1 (1)	SAMSUNG	6,747	17.0%
2 (2)	LG	4,221	10.6%
3 (6)	TOP VICTORY	4,020	10.1%
4 (5)	ACER	2,700	6.8%
5 (3)	PHILIPS	2,538	6.4%
6 (7)	DELTA	2,001	5.0%
7 (11)	TATUNG	1,548	3.9%
8 (8)	ESSEX	1,521	3.8%
9 (-)	LITE-ON	1,462	3.7%
10 (9)	JEAN	1,164	2.9%
Top 10 Total		27,922	70.4%
Others		11,717	29.6%
TOTAL		39,639	100.0%

ALL	Company	Q'ty
1	Samsung	12,381
2	Philips	9,439
3	LG	8,333
4	Top Victory	5,002
5	Acer	4,604
6	Sony	4,502
7	Essex	4,350
8	Daewoo	3,940
9	Lite-on	3,493
10	Jean	3,360
11	Delta	3,302

14"	Company	Q'ty
1	Top Victory	1,590
2	Samsung	1,030
3	Philips	998
4	Jean	860
5	Essex	700
6	LG	678
7	Acer	410
8	ADI	275
9	Lite-on	255
10	Xoceco	255
11	Likom	255
12	Orion	220
13	TVM	200
14	CGC	200
15	Hyundai	158

15"	Company	Q'ty
1	Samsung	5,839
2	LG	4,525
3	Philips	3,390
4	Daewoo	2,930
5	Acer	2,180
6	Top Victory	2,170
7	Delta	2,020
8	Essex	1,790
9	Jean	1,570
10	ADI	1,380
11	Tatung	1,330
12	Compal	1,250

17"	Company	Q'ty	Share
1 (1)	SAMSUNG	10,314	18.7%
2 (2)	PHILIPS	5,001	9.1%
3 (4)	LG	4,762	8.6%
4 (5)	LITE-ON	3,417	6.2%
5 (12)	TOP VICTORY	2,823	5.1%
6 (-)	NMV	2,670	4.8%
7 (3)	SONY	2,000	3.6%
8 (7)	ESSEX	1,629	3.0%
9 (-)	JEAN	1,509	2.7%
10 (-)	SAMPO	1,392	2.5%
Top 10 Total		35,517	64.4%
Others		19,630	35.6%
TOTAL		55,147	100.0%

19"	Company	Q'ty	Share
1 (1)	SONY	1,453	15.2%
2 (2)	LG	918	9.6%
3 (4)	SAMSUNG	756	7.9%
4 (3)	PHILIPS	756	7.9%
5 (-)	NMV	652	6.8%
6 (12)	DELTA	501	5.2%
7 (-)	TOP VICTORY	402	4.2%
8 (8)	KDS	357	3.7%
9 (-)	ESSEX	275	2.9%
10 (-)	SAMPO	249	2.6%
TOP 10 TOTAL		6,319	65.9%
Others		3,273	34.1%
TOTAL		9,592	100.0%

20/21"	Company	Q'ty	Share
1 (1)	SONY	1,265	53.1%
2 (5)	PHILIPS	150	6.3%
3 (2)	MATSUSHITA	120	5.0%
4 (8)	IIYAMA	118	5.0%
5 (11)	KDS	84	3.5%
6 (6)	NOKIA	80	3.4%
7 (-)	NMV	78	3.3%
8 (9)	CAPE	78	3.3%
9 (10)	NANAO	75	3.1%
10 (-)	HITACHI	69	2.9%
Top 10 Total		2,117	88.9%
Others		264	11.1%
TOTAL		2,381	100.0%

17"	Company	Q'ty
1	Samsung	5,036
2	Philips	4,440
3	Sony	2,600
4	LG	2,562
5	Lite-on	2,035
6	Acer	1,870
7	Essex	1,670
8	Nokia	1,385
9	Magtech	1,367
10	Royal	1,320
11	Chuntex	1,275
12	Top Victory	1,206
13	Cape	1,140
14	ADI	1130
15	KDS	1054
16	Delta	995

19"	Company	Q'ty
1	Sony	967
2	LG	543
3	Philips	465
4	Samsung	418
5	Hitachi	372
6	Cape	345
7	Royal	310
8	KDS	263
9	ADI	220
10	Sampo	200
11	Essex	190
12	Delta	157
13	Acer	145
14	Iiyama	143

20/21"	Company	Q'ty
1	Sony	869
2	Matsushita	183
3	Mitsubishi/NHE	174
4	Hitachi	156
5	Philips	146
6	Nokia	115
7	Stesa	96
8	Iiyama	82
9	Cape	80
10	Nanao	90
11	KDS	51
12	Samsung	50

Nationality	new data as of FEB						new data as of FEB						difference
	'001Q	'002Q	'003Q	'004Q	'00TTL	'00TTL	'01/1Q	'01/2Q	'01/3Q	'01/4Q	'01TTL	'01TTL	
ASE	96	99	95	86	1,131	1,131	0	86	100	100	100	1,154	0
CHI	259	262	378	361	3,781	3,781	0	132	142	216	255	2,235	▲ 2,760
EUR	132	145	166	136	1,738	1,738	0	121	113	130	130	1,482	▲ 375
JPN	952	954	901	881	11,065	11,953	▲ 889	691	715	729	651	8,355	▲ 972
KOR	2,878	2,944	3,355	3,355	37,596	37,725	▲ 129	2,954	2,917	3,901	4,538	42,930	▲ 4,359
TWN	4,470	4,804	5,756	4,828	59,575	59,614	▲ 39	3,947	4,709	5,580	5,988	60,668	▲ 4,973
総計	8,787	9,209	10,651	9,647	114,886	115,942	▲ 1,057	7,930	8,695	10,655	11,661	116,823	▲ 12,689
SIZE	new data as of FEB						new data as of FEB						difference
	'001Q	'002Q	'003Q	'004Q	'00TTL	'00TTL	'01/1Q	'01/2Q	'01/3Q	'01/4Q	'01TTL	'01TTL	
14"	673	736	699	601	8,127	8,136	▲ 9	379	453	502	520	5,562	▲ 1,074
15"	3,155	3,209	3,624	3,225	39,639	40,257	▲ 618	2,489	2,423	2,924	3,264	33,305	▲ 8,464
17"	4,034	4,264	5,268	4,817	55,147	55,186	▲ 39	4,210	4,773	5,956	6,516	64,367	▲ 516
19"	728	792	870	807	9,592	9,632	▲ 40	683	837	1,029	1,132	11,041	▲ 2,510
20"21"	198	208	189	198	2,381	2,732	▲ 351	169	209	243	229	2,549	▲ 125
総計	8,787	9,209	10,651	9,647	114,886	115,942	▲ 1,057	7,930	8,695	10,655	11,661	116,823	▲ 12,689
size/type	new data as of FEB						new data as of FEB						difference
	'001Q	'002Q	'003Q	'004Q	'00TTL	'00TTL	'01/1Q	'01/2Q	'01/3Q	'01/4Q	'01TTL	'01TTL	
14"normal	673	736	699	601	8,127	8,136	▲ 9	379	453	502	520	5,562	▲ 1,074
15"normal	3,155	3,209	3,624	3,225	39,639	40,257	▲ 618	2,489	2,423	2,924	3,264	33,305	▲ 8,464
17"90°	3,356	3,328	4,044	3,661	43,167	43,275	▲ 108	3,018	3,304	3,939	4,188	43,346	▲ 1,076
17"flat	677	936	1,224	1,156	11,980	11,911	69	1,192	1,469	2,017	2,329	21,021	560
19"100°	82	113	158	77	1,290	1,320	▲ 30	58	48	76	66	744	▲ 1,062
19"90°	447	445	474	462	5,486	5,456	30	370	499	626	703	6,593	147
19"flat/100°	0	0	0	13	39	39	0	0	5	16	23	132	▲ 732
19"flat/90°	199	234	238	255	2,778	2,817	▲ 40	256	284	311	340	3,572	▲ 863
20"21"normal	198	208	189	198	2,381	2,732	▲ 351	169	209	243	229	2,549	▲ 125
総計	8,787	9,209	10,651	9,647	114,886	115,942	▲ 1,057	7,930	8,695	10,655	11,661	116,823	▲ 12,689
LOCATION	new data as of FEB						new data as of FEB						difference
	'001Q	'002Q	'003Q	'004Q	'00TTL	'00TTL	'01/1Q	'01/2Q	'01/3Q	'01/4Q	'01TTL	'01TTL	
BRAZIL	152	226	196	174	2,245	2,245	0	196	192	274	315	2,931	▲ 420
CHINA	3,402	3,772	4,638	4,273	48,256	48,265	▲ 9	3,745	4,359	5,412	5,899	58,246	▲ 1,860
FINLAND	0	0	0	0	0	0	0	0	0	0	0	0	0
GERMANY	0	0	0	0	0	0	0	0	0	0	0	0	0
HUNGARY	168	186	206	155	2,147	2,147	0	108	120	122	122	1,416	▲ 310
INDIA	0	0	0	0	0	0	0	0	0	0	0	0	0
INDONESIA	207	223	261	175	2,597	2,597	0	167	192	244	281	2,648	▲ 198
ITALY	3	3	3	3	40	40	0	0	0	0	0	0	0
JAPAN	234	229	212	216	2,671	3,520	▲ 849	157	170	161	159	1,941	▲ 530
KOREA	1,488	1,432	1,598	1,471	17,969	18,089	▲ 120	1,081	1,071	1,404	1,607	15,489	▲ 1,893
MALAYSIA	716	730	742	736	8,772	8,772	0	709	728	921	1,002	10,080	▲ 777
MEXICO	934	949	1,030	896	11,427	11,439	▲ 12	755	824	827	894	9,900	▲ 3,015
PHILIPPINE	70	88	103	66	981	981	0	11	11	12	12	138	▲ 873
SINGAPORE	11	8	0	0	58	58	0	0	0	0	0	0	0
TAIWAN	276	296	323	226	3,362	3,401	▲ 39	97	96	105	107	1,211	▲ 1,157
THAILAND	768	724	916	774	9,547	9,547	0	410	457	596	637	6,300	▲ 1,590
TURKEY	44	52	77	77	748	748	0	100	100	130	130	998	382
UK	313	290	346	398	4,043	4,071	▲ 28	395	375	447	498	5,144	▲ 436
USA	0	0	1	7	23	23	0	0	0	0	0	12	▲ 12
総計	8,787	9,209	10,651	9,647	114,886	115,942	▲ 1,057	7,930	8,695	10,655	11,661	116,823	▲ 12,689

As for double count.,,

FoundeBe included in SAMPO (not counted as Founder)

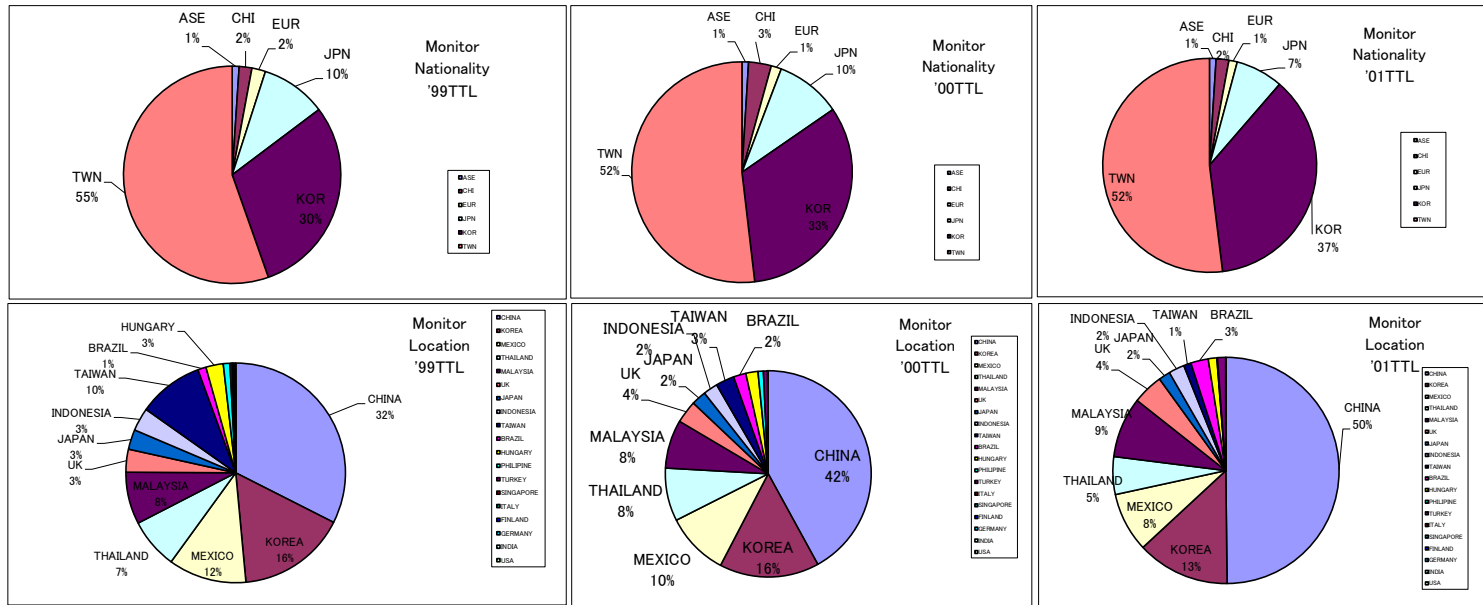
Compal According to domestic sales's information, NMV(NPG) do EMS with Compal.
Are NPG's prod. included in Compal?

TontruEMS with LG.
In this information, Tontru prod. Decreased.
Is this mean that Tonturu prod is included LG's prod.?

Are there other same case?

MONITOR MAKER	new data as of FEB				new data as of FEB				new data as of FEB				new data as of FEB				difference				
	'0010	'0020	'0030	'0040	'00TTL	'00TTL	difference	'01/10	'01/20	'01/30	'01/40	'01TTL	'01TTL	difference	'01/10	'01/20	'01/30	'01/40	'01TTL	'01TTL	difference
ACER	408	419	373	292	4,476	4,476	0	371	396	491	522	5,340	5,370	▲ 30	371	396	491	522	5,340	5,370	▲ 30
ACTION	13	14	17	0	135	135	0	9	11	12	12	132	132	0	9	11	12	12	132	132	0
ADI	156	126	140	67	1,467	1,467	0	76	95	107	122	1,200	399	▲ 801	76	95	107	122	1,200	399	▲ 801
AMTRAN	34	58	55	0	441	441	0	13	15	21	24	219	606	▲ 387	13	15	21	24	219	606	▲ 387
APPLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ASKA	40	41	35	35	452	452	0	15	15	32	32	282	372	▲ 90	15	15	32	32	282	372	▲ 90
BRIDGE	23	32	29	0	250	250	0	13	10	15	14	156	297	▲ 141	13	10	15	14	156	297	▲ 141
CAPE	180	159	196	134	2,007	2,007	0	59	66	71	76	816	2,067	▲ 1,251	59	66	71	76	816	2,067	▲ 1,251
CENTRIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CGC	70	70	102	88	990	990	0	37	47	88	103	825	1,407	▲ 582	37	47	88	103	825	1,407	▲ 582
CHEER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CHUNTEX	94	83	110	119	1,219	1,219	0	77	77	124	124	1,206	1,146	60	77	77	124	124	1,206	1,146	60
CLAIREMONT	3	3	3	3	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CNC	4	3	4	4	44	44	0	4	4	4	4	44	44	0	4	4	4	4	44	44	0
COMPAL	152	146	207	215	2,160	2,160	0	111	189	262	262	2,472	2,370	102	111	189	262	262	2,472	2,370	102
COVEFORD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DAEWOO	177	140	133	115	1,696	1,825	▲ 129	90	91	133	220	1,602	2,109	▲ 507	90	91	133	220	1,602	2,109	▲ 507
DELTA	300	311	412	320	4,029	4,029	0	237	307	368	389	3,903	4,071	▲ 168	237	307	368	389	3,903	4,071	▲ 168
DTK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESSEX	274	333	407	340	4,061	4,061	0	320	456	483	453	5,136	4,356	780	320	456	483	453	5,136	4,356	780
FAIR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FIC	24	20	14	11	207	207	0	0	0	0	0	0	192	▲ 192	0	0	0	0	0	192	▲ 192
FIMI	3	3	3	3	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FOUNDER	36	38	53	70	590	590	0	0	0	0	0	0	855	▲ 855	0	0	0	0	0	855	▲ 855
FUJITSU	18	18	17	24	231	804	▲ 573	24	20	27	34	315	612	▲ 297	24	20	27	34	315	612	▲ 297
GALINDRA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GVC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HANSOL	128	118	143	176	1,695	1,695	0	135	105	163	177	1,740	1,842	▲ 102	135	105	163	177	1,740	1,842	▲ 102
HARTONO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HITACHI	28	36	5	0	206	206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HYUNDAI	122	92	149	213	1,728	1,728	0	113	102	172	185	1,716	1,977	▲ 261	113	102	172	185	1,716	1,977	▲ 261
IJYAMA	56	64	51	50	665	665	0	57	38	31	34	481	455	27	57	38	31	34	481	455	27
JEAN	303	351	353	314	3,963	3,963	0	177	200	270	330	2,931	3,735	▲ 804	177	200	270	330	2,931	3,735	▲ 804
KDS	120	146	150	120	1,608	1,608	0	125	100	130	140	1,485	1,785	▲ 300	125	100	130	140	1,485	1,785	▲ 300
KOREA OTHERS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KUOFENG	82	62	62	0	618	618	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LG	855	832	922	758	10,102	10,102	0	753	749	1,097	1,275	11,622	12,387	▲ 765	753	749	1,097	1,275	11,622	12,387	▲ 765
LIKOM	66	73	74	64	830	830	0	62	76	76	76	870	870	0	62	76	76	76	870	870	0
LITE-ON	405	354	519	444	5,165	5,165	0	412	410	595	610	6,081	7,029	▲ 948	412	410	595	610	6,081	7,029	▲ 948
MAG-TECH	100	90	111	99	1,200	1,200	0	63	79	84	84	930	906	24	63	79	84	84	930	906	24
MATSUSHITA	55	57	57	58	681	681	0	0	0	0	0	0	408	▲ 408	0	0	0	0	0	408	▲ 408
MEM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
METRODATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MICROVITEC	3	3	3	3	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MITAC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MITSUBISHI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MTV	15	15	18	18	199	199	0	20	20	20	20	240	240	0	20	20	20	20	240	240	0
NANAO	32	29	22	23	317	289	28	25	25	21	25	290	250	40	25	25	21	25	290	250	40
NKV	342	382	336	337	4,192	4,305	▲ 113	315	343	428	343	4,287	3,894	393	315	343	428	343	4,287	3,894	393
NOKIA	78	83	80	50	875	875	0	21	13	0	0	102	109	▲ 7	21	13	0	0	102	109	▲ 7
ORION	150	138	155	133	1,729	1,729	0	126	118	145	165	1,662	2,211	▲ 549	126	118	145	165	1,662	2,211	▲ 549
PHILIPS	625	736	844	785	8,970	8,970	0	821	948	934	924	10,881	11,334	▲ 453	821	948	934	924	10,881	11,334	▲ 453
ROYAL	131	122	177	75	1,515	1,515	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAMPO	159	193	212	142	2,118	2,118	0	159	174	197	222	2,256	2,397	▲ 141	159	174	197	222	2,256	2,397	▲ 141
SAMSUNG	1,326	1,478	1,703	1,839	19,038	19,038	0	1,612	1,652	2,061	2,376	23,103	24,978	▲ 1,875	1,612	1,652	2,061	2,376	23,103	24,978	▲ 1,875
SHAMROCK	0	60	100	95	765	765	0	40	60	100	100	900	1,410	▲ 510	40	60	100	100	900	1,410	▲ 510
SHINLEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SONICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SONY	416	364	409	384	4,719	4,949	▲ 230	269	288	221	216	2,982	3,654	▲ 672	269	288	221	216	2,982	3,654	▲ 672
STESA	11	8	0	0	58	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TATUNG	226	201	256	304	2,961	2,961	0	126	152	206	242	2,178	2,493	▲ 315	126	152	206	242	2,178	2,493	▲ 315
TECMA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TECO	89	94	107	84	1,122	1,122	0	95	99	108	109	1,232	978	254	95	99	108	109	1,232	978	254
TONTRU	63	66	113	90	996	996	0	20	20	30	40	330	1,365	▲ 1,035	20	20	30	40	330	1,365	▲ 1,035
TOP VICTORY	605	750	940	900	9,586	9,586	0	690	886	1,040	1,270	11,658	12,984	▲ 1,326	690	886	1,040	1,270	11,658	12,984	▲ 1,326
TOPFLY	10	10	11	6	111	150	▲ 39	5	2	0	0	21	138	▲ 117	5	2	0	0	21	138	▲ 117
TOTOKU	5	5	4	4	55	55	0	0	0	0	0	0	55	▲ 55	0	0	0	0	0	55	▲ 55
TVM	77	80	88	65	930	930	0	61	64	74	79	828	1,038	▲ 210	61	64	74	79	828	1,038	▲ 210
TYSTAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VESTEL	44	52	77	77	748	748	0	100	100	130	130	1,380	998	382	100	100	130	130	1,380	998	382
WESTLAKE	0	5	5	10	60	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WINWAY	0	0	16	17	99	99	0	13													

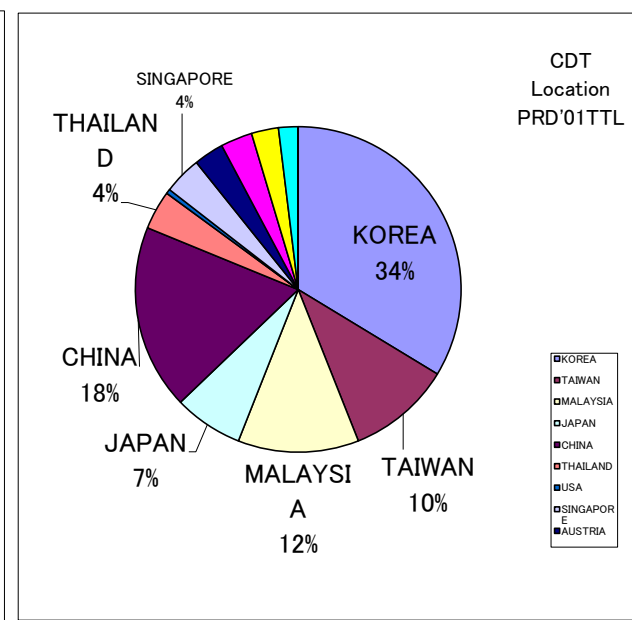
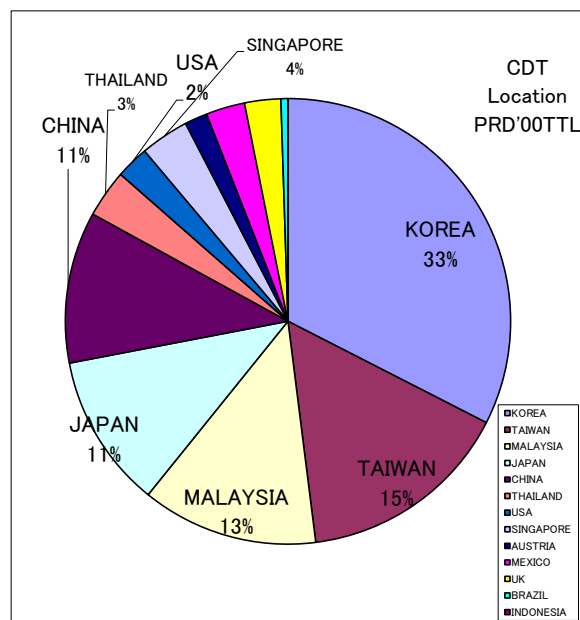
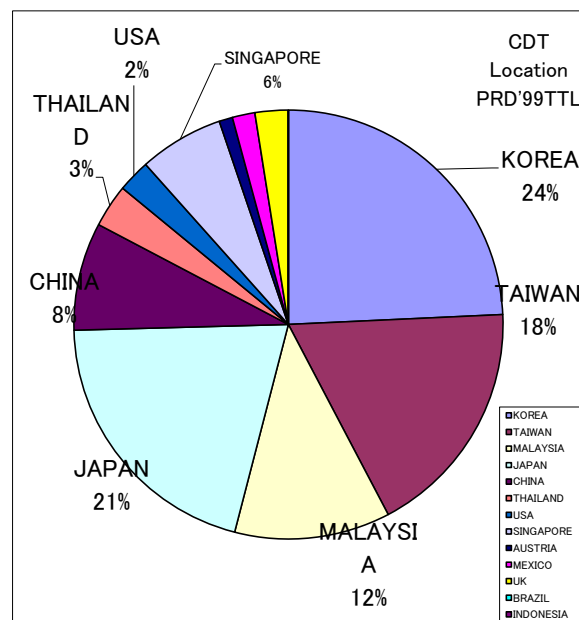
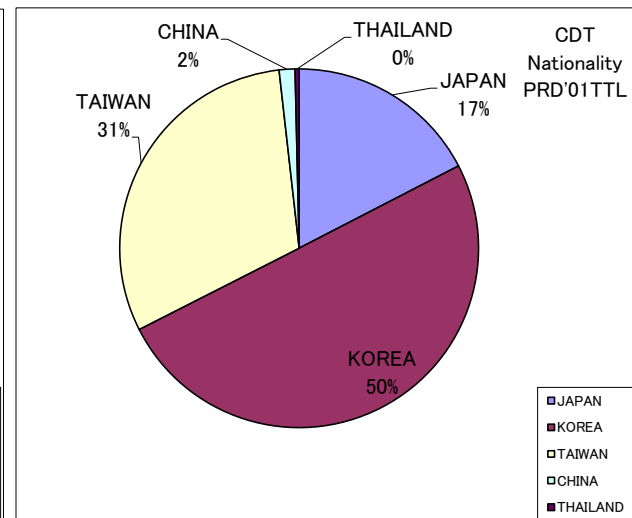
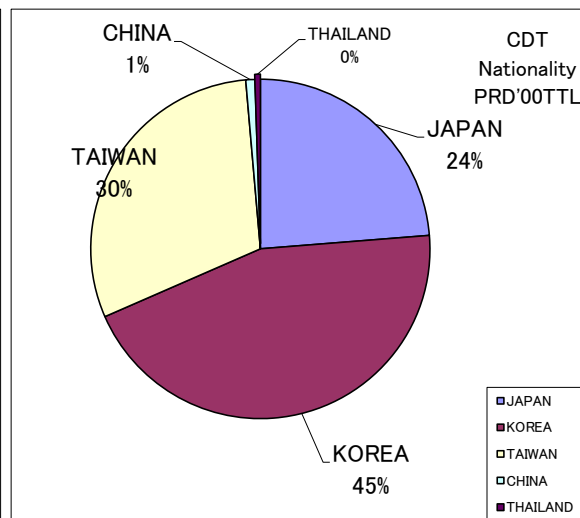
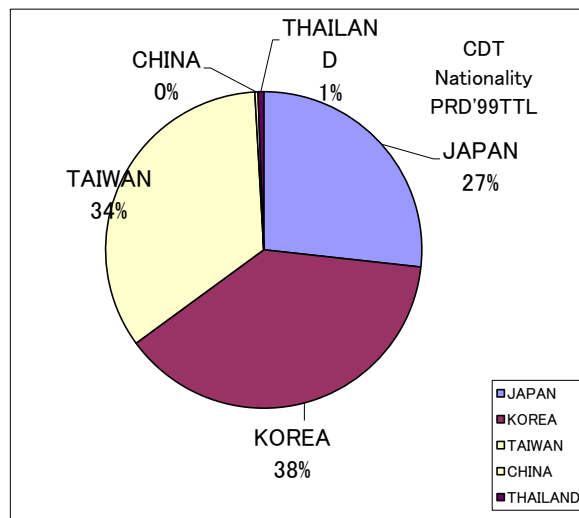
[CDT Monitor Production Trend]



LOCATION	データ	
	'00TTL	'01TTL
CHINA	48,256	58,246
KOREA	17,969	15,489
MEXICO	11,427	9,900
THAILAND	9,547	6,300
MALAYSIA	8,772	10,080
UK	4,043	5,144
JAPAN	2,671	1,941
INDONESIA	2,597	2,648
TAIWAN	3,362	1,211
BRAZIL	2,245	2,931
HUNGARY	2,147	1,416
PHILIPINE	981	138
TURKEY	748	1,380
ITALY	40	0
SINGAPORE	58	0
FINLAND	0	0
GERMANY	0	0
INDIA	0	0
USA	23	0
総計	114,886	116,823

Nationality	データ	
	'00TTL	'01TTL
ASE	1,131	1,154
CHI	3,781	2,235
EUR	1,738	1,482
JPN	11,065	8,355
KOR	37,596	42,930
TWN	59,575	60,668
総計	114,886	116,823

[CDT Production Trend]



99Cpa TTL

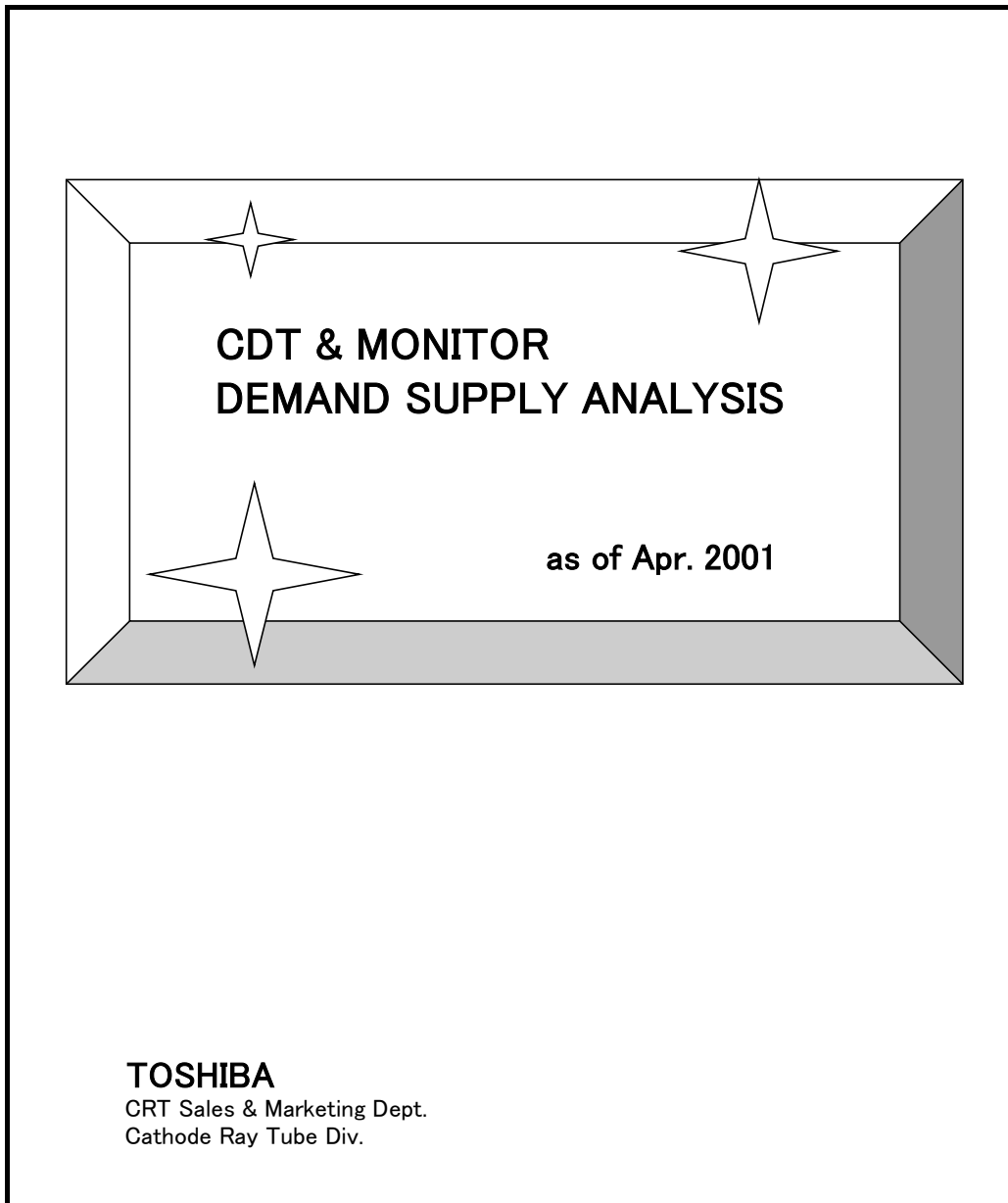
データ

NATION	計
KOREA	34215
TAIWAN	25452
MALAYSIA	16569
JAPAN	28995
CHINA	11460
THAILAND	4590
USA	3450
SINGAPORE	9000
AUSTRIA	1440
MEXICO	2400
UK	3510
BRAZIL	0
INDONESIA	0
総計	141081

NATION	00ProdTTL	01ProdTTL
KOREA	37239	33567
TAIWAN	17733	10245
MALAYSIA	14649	11943
JAPAN	12819	6837
CHINA	12597	18255
THAILAND	3960	3870
USA	2760	450
SINGAPORE	4035	3723
AUSTRIA	1890	2970
MEXICO	3234	3120
UK	3000	2700
BRAZIL	585	1920
INDONESIA	0	0
総計	114501	99600

99ProdTTL	計
NATIONALITY	計
JAPAN	27177
KOREA	38859
TAIWAN	34715.1
CHINA	300
THAILAND	600
総計	101651

	データ	
NATIONALITY	00ProdTTL	01ProdTTL
JAPAN	27174	17331
KOREA	51222	49929
TAIWAN	34515	30570
CHINA	990	1410
THAILAND	600	360
総計	114501	99600



[CDT Manufacturers Operation Ratio]**«1999»**

(Kpcs)	CDT Capacity	CDT Production	Operation Ratio
	141,081	101,651	72%
14"	9,930	9,192	93%
15"	47,655	40,847	86%
17"	64,359	43,671	68%
19"	14,457	5,691	39%
20"/21"	4,680	2,250	48%

Toshiba	8,085	7,707	95%
Sony	11,070	7,062	64%
Hitachi	16,440	5,595	34%
MEC	10,080	3,066	30%
NEC	2,400	993	41%
Mitsubishi	4,050	2,754	68%

	52,125	27,177	52%
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Chungwah	28,302	22,623	80%
Philips	10,959	10,494	96%
Teco	2,880	1,598	55%

	42,141	34,715	82%
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Samsung	22,260	20,676	93%
LG	14,520	12,735	88%
Orion	7,395	5,448	74%

	44,175	38,859	88%
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Xian 4400	960	300	31%
T—CRT	1,200	600	50%

	2,160	900	42%
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«2000»

	CDT Capacity	CDT Production	Operation Ratio
	146,175	114,501	78%
14"	10,860	7,854	72%
15"	50,400	40,884	81%
17"	66,210	53,562	81%
19"	14,025	9,249	66%
20"/21"	4,680	2,952	63%

Toshiba	6,960	7,128	102%
Sony	11,190	8,121	73%
Hitachi	12,390	5,154	42%
MEC	2,520	1,167	46%
NEC			
Mitsubishi	6,000	5,604	93%

	39,060	27,174	70%
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Chungwah	30,480	23,775	78%
Philips	11,400	9,090	80%
Teco	3,210	1,650	51%

	45,090	34,515	77%
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Samsung	29,325	25,104	86%
LG	20,700	18,621	90%
Orion	9,840	7,497	76%

	59,865	51,222	86%
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Xian 4400	960	990	103%
T—CRT	1,200	600	50%

	2,160	1,590	74%
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«2001»

	CDT Capacity	CDT Production	Operation Ratio	(previous)
	143,718	99,600	69%	(84%)
14"	8,190	4,386	54%	(72%)
15"	42,060	30,105	72%	(86%)
17"	73,713	56,076	76%	(88%)
19"	15,705	6,795	43%	(66%)
20"/21"	4,050	2,238	55%	(60%)

Toshiba	6,900	4,818	70%	(88%)
Sony	8,370	5,391	64%	(68%)
Hitachi	7,260	2,961	41%	(54%)
MEC	2,520	135	5%	(38%)
NEC				
Mitsubishi	6,000	4,026	67%	(81%)

	31,050	17,331	56%	(69%)
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Chungwah	30,960	20,910	68%	(76%)
Philips	14,385	9,285	65%	(83%)
Teco	3,240	375	12%	(69%)

	48,585	30,570	63%	(77%)
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Samsung	28,983	25,035	86%	(98%)
LG	21,420	17,400	81%	(97%)
Orion	9,840	7,494	76%	(86%)

	60,243	49,929	83%	(96%)
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Xian 4400	1,530	1,410	92%	(92%)
T—CRT	2,310	360	16%	(50%)

	3,840	1,770	46%	(74%)
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Summary of this times' Analysis

as of April./26th/'01 W-W MTG

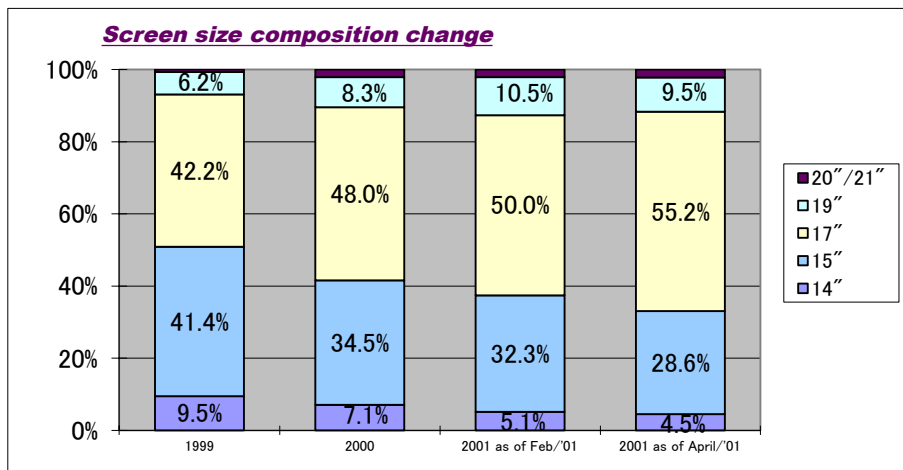
Monitor Production (Mil.sets)

	<u>1999Actual</u>	<u>2000Actual</u>	'99vs'00Growth	<u>2001Forecast</u>	<u>Latet</u> as of April/'01	Feb vs April Growth	'00vs'01(Apr.)Growth
				as of Feb/'01			
14"	9.5	8.1	85%	6.6(5.1%)	5.6(4.8%)	85%	69%
15"	41.5	39.6	95%	41.8(32.3%)	33.3(28.5%)	80%	85%
17"	42.3	55.2	130%	64.9(50.0%)	64.4(55%)	99%	117%
19"	6.2	9.6	155%	13.5(10.5%)	11(9.4%)	81%	115%
20"/21"	2.2	2.4	109%	2.7(2.1%)	2.5(2.1%)	93%	104%
Total	101.5	114.9 *1	113%	129.5	116.8	90%	102%
1H:2H Pdt.Ratio	45% : 55%	47% : 53%		43% : 57%	43% : 57%		
				55.2 : 74.3 Mil	50 : 67.1 Mil		

*1:cause of decreasing q'ty of Japanese MTR maker's producing, TTL q'ty has decreased by 1.1Mil from the informed in Feb.

'01 MNTR Prod. Plan vs Previous Result

	'99 Actual	00 Actual	'01 Plan	Vari	Growth Rate	Vari	Growth Rate
			as of Feb'01	as of April '01	Feb'01 vs April'01	Feb'01 vs April'01	'00 vs Apr '01
							'00 vs '01
Samsung	12.4	19.0	25.0	23.1	▲ 1.9	92%	4.1
LG	8.3	10.1	12.4	11.6	▲ 0.8	94%	1.5
Top victory	5.0	9.6	13.0	11.7	▲ 1.3	90%	2.1
Philips	9.4	9.0	10.1	10.9	0.8	108%	1.9
Lite-on	3.5	5.2	7.0	6.1	▲ 0.9	87%	0.9
Sony	4.5	4.7	3.7	3.0	▲ 0.7	81%	▲ 1.7
Acer	4.6	4.5	5.4	5.3	▲ 0.1	98%	0.8
NMV	2.2	4.2	4.0	4.3	0.3	108%	0.1
Delta	3.3	4.0	4.1	3.9	▲ 0.2	95%	▲ 0.1
Essex	4.4	4.1	4.4	5.1	0.7	116%	1.0
Jean	3.7	4.0	3.7	2.9	▲ 0.8	78%	▲ 1.1
Compal	2.1	2.2	2.4	2.5	0.1	104%	0.3
Sampo	1.6	2.1	2.4	2.3	▲ 0.1	96%	0.2
ADI	3.0	1.5	0.4	1.2	0.8	300%	▲ 0.3
Royal	2.5	1.5	0.0	0.0	0.0	#DIV/0!	▲ 1.5
Daewoo	3.9	1.7	2.1	1.6	▲ 0.5	76%	▲ 0.1
Magtech	1.8	1.2	0.9	0.9	0.0	100%	▲ 0.3
Vestel	0.3	0.7	1.0	1.4	0.4	140%	0.7
Xococo	0	0.7	0.9	0.8	▲ 0.1	89%	0.1

'01 Mntr Prod. Plan Screen size composition change**'01/1Q Production Result**

QTY:KP

	'00/1Q	'01/1Q Production Forecast			Diff. Apr. vs Feb..	Growth Ratio 00/1Q vs '01/1Q
		Nov./'00	Feb./'01	Apr./'01		
14"	2,019	1,687	1,443	1,137	▲ 306	56%
15"	9,465	9,992	8,646	7,467	▲ 1179	79%
17"	12,102	14,759	12,486	12,630	▲ 144	104%
19"	2,184	2,623	2,436	2,049	▲ 387	94%
20"21"	594	701	609	507	▲ 102	85%
total	26,364	29,762	25,620	23,790	▲ 1,830	90%

'01/2Q Production Forecast Change

QTY:KP

	'00/2Q	'01/2Q Production Forecast			Diff. Apr. vs Feb..	Growth Ratio 00/2Q vs '01/2Q
		Nov./'00	Feb./'00	Apr./'01		
14"	2,208	1,796	1,548	1,359	▲ 189	62%
15"	9,627	10,562	9,570	7,269	▲ 2301	76%
17"	12,792	16,192	14,808	14,319	▲ 489	112%
19"	2,376	3,130	3,048	2,511	▲ 537	106%
20"21"	624	750	645	627	▲ 18	100%
total	27,627	32,430	29,619	26,085	▲ 3,534	94%

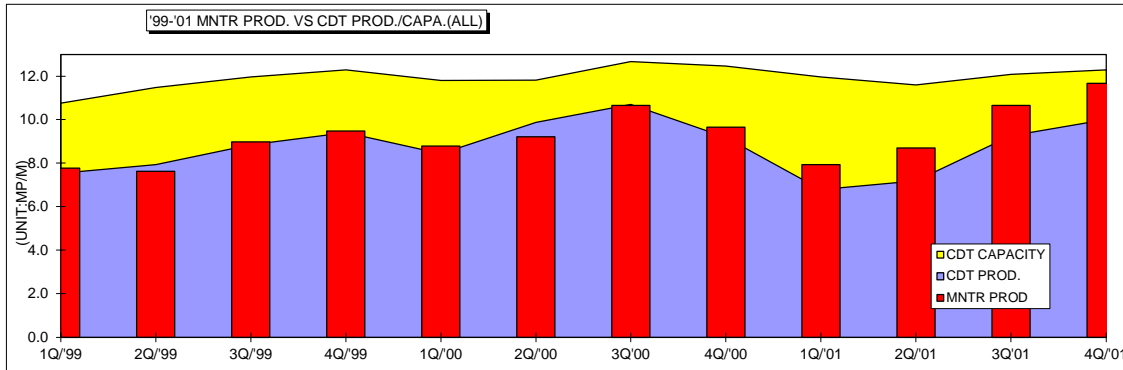
'00/'01 Production Growth Ratio of same period

	'00/1Q	'01/1Q	Growth Ratio 00/1Q vs '01/1Q	'00/2Q	'01/2Q	Growth Ratio 00/2Q vs '01/2Q
14"	2,019	1,137	56%	2,208	1,359	62%
15"	9,465	7,467	79%	9,627	7,269	76%
17"	12,102	12,630	104%	12,792	14,319	112%
19"	2,184	2,049	94%	2,376	2,511	106%
20"21"	594	507	85%	624	627	100%
total	26,364	23,790	90%	27,627	26,085	94%

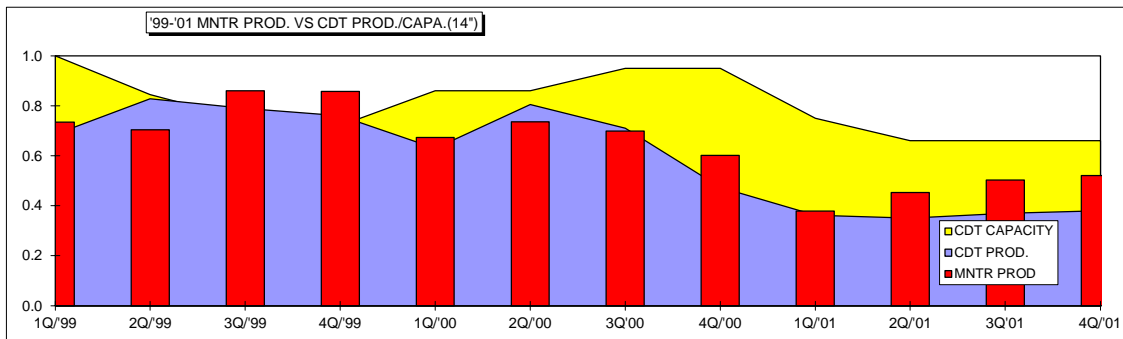
	'00/3Q	'01/3Q	Growth Ratio 00/3Q vs '01/3Q	'00/4Q	'01/4Q	Growth Ratio 00/4Q vs '01/4Q
14"	2,097	1,506	72%	1,803	1,560	87%
15"	10,872	8,772	81%	9,675	9,792	101%
17"	15,804	17,868	113%	14,451	19,548	135%
19"	2,610	3,087	118%	2,421	3,396	140%
20"21"	567	729	129%	594	687	116%
total	31,950	31,962	100%	28,944	34,983	121%

'99-'01 MONITOR PROD. VS CDT PROD./CAPA.

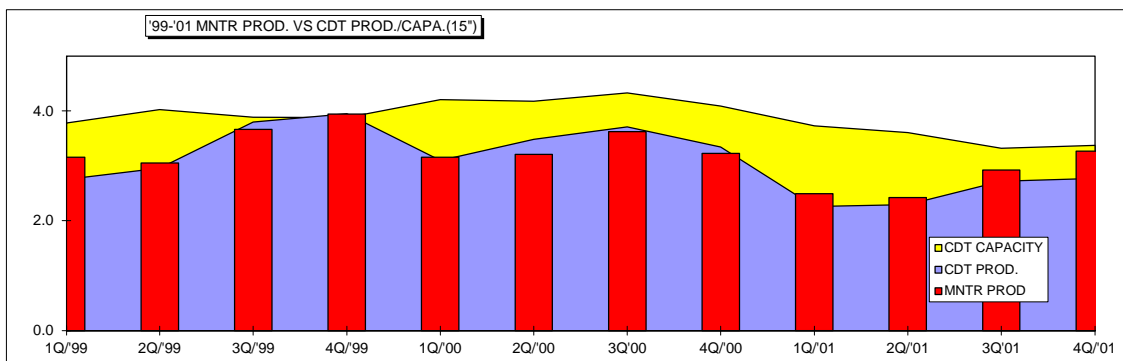
Apr.26th '01 W-W MTG



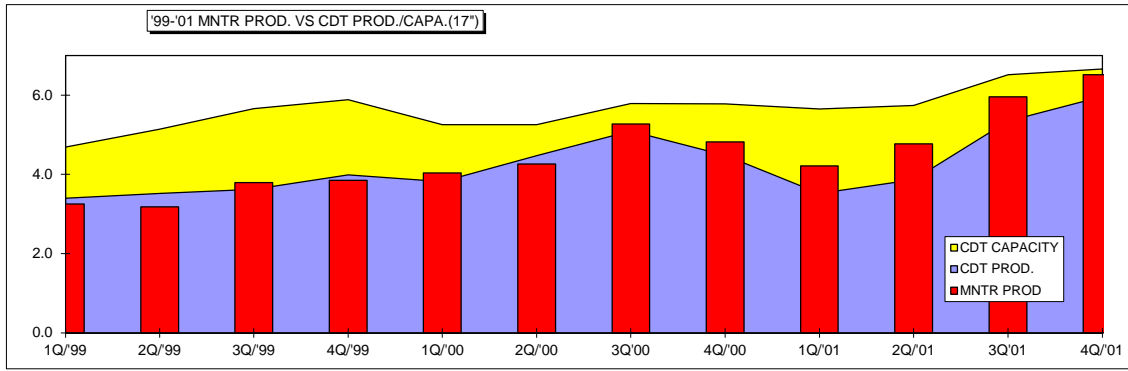
	1Q/99	2Q/99	3Q/99	4Q/99	'99TTL	1Q/00	2Q/00	3Q/00	4Q/00	'00TTL	1Q/01	2Q/01	3Q/01	4Q/01	'01TTL
MNTR PROD	7.8	7.6	9.0	9.5	101.5	8.8	9.2	10.7	9.6	114.9	7.9	8.7	10.7	11.7	116.8
CDT PROD.	7.5	7.9	8.8	9.4	101.1	8.4	9.9	10.7	9.2	114.5	6.8	7.2	9.2	10.0	99.6
CDT CAPACITY	10.8	11.5	12.0	12.3	139.4	11.8	11.8	12.7	12.5	146.2	12.0	11.6	12.1	12.3	143.7
MNTR PROD. VS CDT PROD.	-0.2	0.3	-0.1	-0.1	-0.4	-0.4	0.7	0.0	-0.5	-0.4	-1.2	-1.5	-1.4	-1.7	-17.2
	97%	104%	98%	99%	100%	96%	107%	100%	95%	100%	85%	83%	87%	86%	85%
MNTR PROD.VS CDT CAPA	3.0	3.9	3.0	2.8	37.9	3.0	2.6	2.0	2.8	31.3	4.0	2.9	1.4	0.6	26.9
	138%	151%	133%	130%	137%	134%	128%	119%	129%	127%	151%	133%	113%	105%	123%



	1Q/99	2Q/99	3Q/99	4Q/99	'99TTL	1Q/00	2Q/00	3Q/00	4Q/00	'00TTL	1Q/01	2Q/01	3Q/01	4Q/01	'01TTL
MNTR PROD	0.7	0.7	0.9	0.9	9.5	0.7	0.7	0.7	0.6	8.1	0.4	0.5	0.5	0.5	5.6
CDT PROD.	0.7	0.8	0.8	0.8	9.2	0.6	0.8	0.7	0.5	7.9	0.4	0.4	0.4	0.4	4.4
CDT CAPACITY	1.0	0.8	0.7	0.7	9.9	0.9	0.9	1.0	1.0	10.9	0.8	0.7	0.7	0.7	8.2
MNTR PROD. VS CDT PROD.	0.0	0.1	-0.1	-0.1	-0.3	0.0	0.1	0.0	-0.1	-0.3	0.0	-0.1	-0.1	-0.1	-1.2
	93%	118%	92%	89%	97%	94%	109%	102%	79%	97%	96%	77%	74%	73%	79%
MNTR PROD.VS CDT CAPA	0.3	0.1	-0.1	-0.1	0.5	0.2	0.1	0.3	0.3	2.7	0.4	0.2	0.2	0.1	2.6
	136%	120%	87%	84%	105%	128%	117%	136%	158%	134%	198%	146%	131%	127%	147%



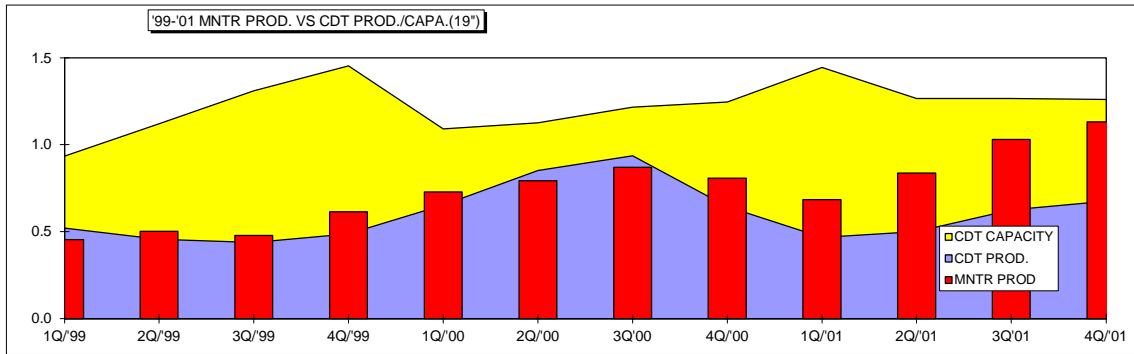
	1Q/99	2Q/99	3Q/99	4Q/99	'99TTL	1Q/00	2Q/00	3Q/00	4Q/00	'00TTL	1Q/01	2Q/01	3Q/01	4Q/01	'01TTL
MNTR PROD	3.2	3.1	3.7	3.9	41.4	3.2	3.2	3.6	3.2	39.6	2.5	2.4	2.9	3.3	33.3
CDT PROD.	2.8	3.0	3.8	4.0	40.4	3.1	3.5	3.7	3.3	40.9	2.3	2.3	2.7	2.8	30.1
CDT CAPACITY	3.8	4.0	3.9	3.9	46.7	4.2	4.2	4.3	4.1	50.4	3.7	3.6	3.3	3.4	42.1
MNTR PROD. VS CDT PROD.	-0.4	-0.1	0.1	0.0	-1.1	-0.1	0.3	0.1	0.1	1.2	-0.2	-0.1	-0.2	-0.5	-3.2
	87%	97%	104%	100%	97%	98%	109%	102%	104%	103%	91%	95%	93%	85%	90%
MNTR PROD.VS CDT CAPA	0.6	1.0	0.2	-0.1	5.3	1.1	1.0	0.7	0.9	10.8	1.2	1.2	0.4	0.1	8.8
	120%	132%	106%	98%	113%	133%	130%	119%	127%	127%	150%	149%	114%	103%	126%



	1Q/99	2Q/99	3Q/99	4Q/99	'99TTL	1Q/00	2Q/00	3Q/00	4Q/00	'00TTL	1Q/01	2Q/01	3Q/01	4Q/01	'01TTL
MNTR PROD.	3.3	3.2	3.8	3.9	42.2	4.0	4.3	5.3	4.8	55.1	4.2	4.8	6.0	6.5	64.4
CDT PROD.	3.4	3.5	3.6	4.0	43.6	3.8	4.5	5.1	4.5	53.6	3.5	3.9	5.3	6.0	56.1
CDT CAPACITY	4.7	5.1	5.7	5.9	64.1	5.3	5.3	5.8	5.8	66.2	5.7	5.7	6.5	6.7	73.7

MNTR PROD. VS CDT PROD.	0.1	0.3	-0.2	0.1	1.3	-0.2	0.2	-0.2	-0.3	-1.6	-0.7	-0.9	-0.6	-0.5	-8.3
	104%	110%	96%	103%	103%	95%	105%	97%	93%	97%	84%	81%	90%	92%	87%

MNTR PROD.VS CDT CAPA	1.4	2.0	1.9	2.0	21.9	1.2	1.0	0.5	1.0	11.1	1.4	1.0	0.6	0.1	9.3
	144%	162%	149%	153%	152%	130%	123%	110%	120%	120%	134%	120%	109%	102%	115%



	1Q/99	2Q/99	3Q/99	4Q/99	'99TTL	1Q/00	2Q/00	3Q/00	4Q/00	'00TTL	1Q/01	2Q/01	3Q/01	4Q/01	'01TTL
MNTR PROD.	0.5	0.5	0.5	0.6	6.1	0.7	0.8	0.9	0.8	9.6	0.7	0.8	1.0	1.1	11.0
CDT PROD.	0.5	0.5	0.4	0.5	5.7	0.7	0.9	0.9	0.6	9.2	0.5	0.5	0.6	0.7	6.8
CDT CAPACITY	0.9	1.1	1.3	1.5	14.5	1.1	1.1	1.2	1.2	14.0	1.4	1.3	1.3	1.3	15.7

MNTR PROD. VS CDT PROD.	0.1	0.0	0.0	-0.1	-0.4	-0.1	0.1	0.1	-0.2	-0.3	-0.2	-0.3	-0.4	-0.5	-4.2
	115%	91%	91%	79%	93%	90%	107%	108%	80%	96%	68%	60%	61%	60%	62%

MNTR PROD.VS CDT CAPA	0.5	0.6	0.8	0.8	8.3	0.4	0.3	0.3	0.4	4.4	0.8	0.4	0.2	0.1	4.7
	206%	224%	274%	237%	236%	150%	142%	140%	154%	146%	212%	151%	123%	111%	142%

17"Flat Monitor Production

	1Q/'00	2Q	3Q	4Q	TTL
Samsung	46	220	320	278	2,592
LG	61	116	119	190	1,458
ADI	10	13	60	20	309
CAPE	64	55	60	40	657
Lite-On	15	25	27	18	255
Delta	3	9	35	25	216
NMV	174	170	152	154	1,950
Sony	182	148	180	149	1,977
Others	122	180	271	282	2,565
TTL	677	936	1,224	1,156	11,979

Flat Ratio 16% 22% 23% 24% 22%

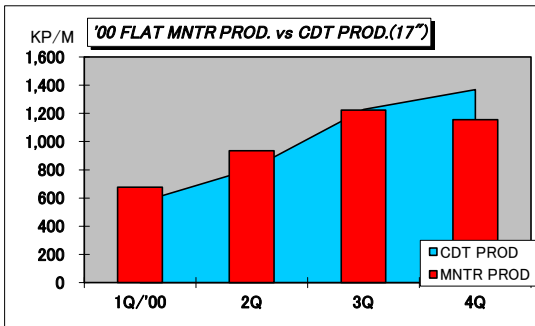
17"Flat CDT Production

	1Q/'00	2Q	3Q	4Q	TTL
SDI	32	105	270	330	2,211
LG	50	80	170	223	1,569
Sony	264	351	404	307	3,978
Mitsubishi	223	260	344	358	3,555
Hitachi	0	0	0	60	180
Toshiba	0	0	0	6	18
Chungwah	0	10	40	85	405
TTL	569	806	1,228	1,369	11,916

Flat Ratio 15% 18% 24% 31% 22%

CDT vs Monitor

	1Q/'00	2Q	3Q	4Q	TTL
▲	108	130	4	213	▲ 631

**19"Flat Monitor Production**

	1Q/'00	2Q	3Q	4Q	TTL
Samsung	7	15	20	30	216
LG	0	0	0	7	21
ACM	2	3	5	6	48
Philips	5	3	5	6	57
Lite-On	0	0	0	0	0
ADI	3	3	2	0	24
NMV	30	63	44	42	537
Sony	128	112	124	120	1,452
Others	24	35	38	57	462
TTL	199	234	238	268	2,817

Flat Ratio 27% 30% 27% 33% 29%

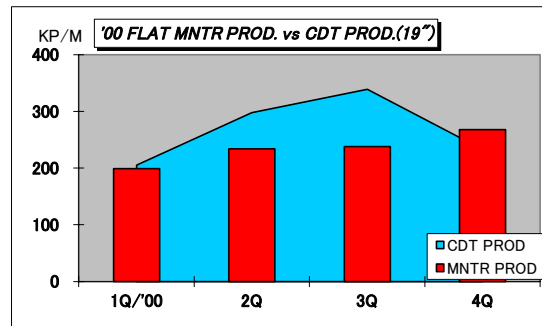
19"Flat CDT Production

	1Q/'00	2Q	3Q	4Q	TTL
SDI	8	15	15	13	153
LG	0	0	0	5	15
Sony	120	153	175	131	1,737
Mitsubishi	77	130	139	52	1,194
Hitachi	0	0	10	32	126
Chungwah	0	0	0	0	0
TTL	205	298	339	233	3,225

Flat Ratio 31% 35% 36% 36% 35%

CDT vs Monitor

	1Q/'00	2Q	3Q	4Q	TTL
▲	6	64	101	▲ 35	408



以下デ-タ-ス

<Flat Monitor Production Status>
(kp/M)

17"	1Q	2Q	3Q	4Q	TTL
Mag	0	0	0	0	0
Chuntex	0	0	0	0	0
ADI	0	0	0	0	0
Philips	0	0	0	0	0
Lite-on	0	0	0	0	0
Acer	0	0	0	0	0
Delta	0	0	0	0	0
Amtran	0	0	0	0	0
Royal	0	0	0	0	0
Sampo	0	0	0	0	0
Jean	0	0	0	0	0
Tatung	0	0	0	0	0
Sony	0	0	0	0	0
Iiyama	0	0	0	0	0
NMV	0	0	0	0	0
Nanao	0	0	0	0	0
Hitachi	0	0	0	0	0
Fujitsu	0	0	0	0	0
Samsung	0	0	0	0	0
LG	0	0	0	0	0
KDS	0	0	0	0	0
Nokia	0	0	0	0	0
TTL	0	0	0	0	0

differ 569 806 1228 1369 11916

KOREA	0	0	0	0	0
TWN	0	0	0	0	0
JPN	0	0	0	0	0
OTHERS	0	0	0	0	0
TTL	0	0	0	0	0

00Flat

19"	1Q	2Q	3Q	4Q	TTL
Mag	0	0	0	0	0
Chuntex	0	0	0	0	0
ADI	0	0	0	0	0
Philips	0	0	0	0	0
Lite-on	0	0	0	0	0
Acer	0	0	0	0	0
Delta	0	0	0	0	0
Amtran	0	0	0	0	0
Royal	0	0	0	0	0
Sampo	0	0	0	0	0
Jean	0	0	0	0	0
Tatung	0	0	0	0	0
Sony	0	0	0	0	0
Iiyama	0	0	0	0	0
NMV	0	0	0	0	0
Nanao	0	0	0	0	0
Hitachi	0	0	0	0	0
Fujitsu	0	0	0	0	0
Samsung	0	0	0	0	0
LG	0	0	0	0	0
KDS	0	0	0	0	0
Nokia	0	0	0	0	0
TTL	0	0	0	0	0

differ 205 298 339 233 3225

KOREA	0	0	0	0	0
TWN	0	0	0	0	0
JPN	0	0	0	0	0
OTHERS	0	0	0	0	0
TTL	0	0	0	0	0

17"Flat Monitor Production Forecast

	1Q/01	2Q	3Q	4Q	TTL	(%TTL)
Samsung	180	275	390	515	4,080	2,592
LG	177	223	372	433	3,615	1,458
CAPE	40	45	50	55	570	657
Delta	30	40	50	50	510	216
Philips	70	80	91	101	1,026	246
Lite-On	15	15	50	80	480	255
NMV	140	140	170	140	1,770	1,950
Sony	118	111	75	74	1,134	1,977
Others	422	540	769	881	7,836	2,628
TTL	1,192	1,469	2,017	2,329	21,021	11,979

Flat Ratio 28% 31% 34% 36% 33%

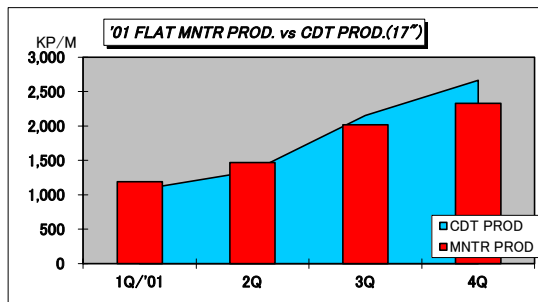
17"Flat CDT Production Status

	1Q/01	2Q	3Q	4Q	TTL	(%TTL)
SDI	260	410	520	620	5,430	2,211
LG	203	202	470	560	4,305	1,569
OEC	0	30	50	50	390	0
Sony	180	120	200	270	2,310	3,978
Mitsubishi	206	180	240	300	2,778	3,555
Hitachi	45	60	60	90	765	180
Toshiba	3	30	150	220	1,209	18
Chungwah	150	280	380	450	3,780	405
Philips	0	0	50	70	360	0
TECO	25	30	35	35	375	0
TTL	1,072	1,342	2,155	2,665	21,702	11,916

Flat Ratio 30% 35% 40% 45% 39%

CDT vs Monitor

	1Q/01	2Q	3Q	4Q	TTL
CDT	120	127	138	336	681
Monitor	120	127	138	336	681



以下データは、

<Flat Monitor Production Status> (k p/M)

17"	1Q	2Q	3Q	4Q	TTL
Mag	0	0	0	0	0
Chuntex	0	0	0	0	0
ADI	0	0	0	0	0
Philips	0	0	0	0	0
Lite-on	0	0	0	0	0
Acer	0	0	0	0	0
Delta	0	0	0	0	0
Amtran	0	0	0	0	0
Royal	0	0	0	0	0
Sampo	0	0	0	0	0
Jean	0	0	0	0	0
Tatung	0	0	0	0	0
Sony	0	0	0	0	0
Iiyama	0	0	0	0	0
NMV	0	0	0	0	0
Nanao	0	0	0	0	0
Hitachi	0	0	0	0	0
Fujitsu	0	0	0	0	0
Samsung	0	0	0	0	0
LG	0	0	0	0	0
KDS	0	0	0	0	0
Nokia	0	0	0	0	0
TTL	0	0	0	0	0
differ	1072	1342	2155	2665	21702
KOREA	0	0	0	0	0
TWN	0	0	0	0	0
JPN	0	0	0	0	0
OTHERS	0	0	0	0	0
TTL	0	0	0	0	0

19"Flat Monitor Production Forecast

	1Q/01	2Q	3Q	4Q	TTL	(%TTL)
Samsung	20	30	45	60	465	216
LG	9	10	15	18	156	21
ACM	1	1	2	2	18	48
Philips	8	8	6	6	84	57
Delta	2	2	3	4	33	0
Lite-On	6	10	20	20	168	0
NMV	75	80	100	80	1,005	537
Sony	78	85	43	43	747	1,452
Others	57	63	93	130	1,029	486
TTL	256	289	327	363	3,705	2,817

Flat Raio 37% 35% 32% 32% 32%

19"Flat CDT Production Status

	1Q/01	2Q	3Q	4Q	TTL	(%TTL)
SDI	13	15	25	25	234	153
LG	13	15	30	30	264	15
Sony	70	60	70	70	810	1,737
Mitsubishi	33	50	60	70	639	1,194
Hitachi	30	34	28	40	396	126
Chungwah	0	0	5	10	45	0
TTL	159	174	218	245	2,388	3,225

Flat Ratio 34% 35% 35% 36% 35%

CDT vs Monitor

	1Q/01	2Q	3Q	4Q	TTL
CDT	97	115	109	118	1,317
Monitor	97	115	109	118	1,317

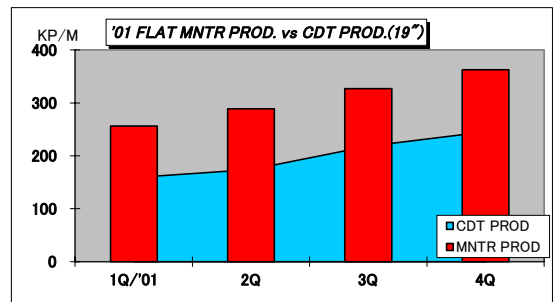


EXHIBIT 33

Produced Natively

World Wide Monitor Production Forecast

AS OF APR'98
CRT Sales Marketing Dept.

MONITOR MAKER	LOCATION	Nationality	PRODUCTION (KP/M)							PRODUCTION (KP/M)						
			'96							'98						
			4Q	1Q	2Q	3Q	4Q	TTL	1Q	2Q	3Q	4Q	TTL			
ACER	TAIWAN	TWN14	14"					0					0	14"		
		TWN15	15"		30	23	83	80	648	70	67	60	60	771	15"	
		TWN17	17"		27	20	53	50	450	50	50	72	75	741	17"	
		TWN19	19"						0	3	3	7	9	66	17"	
		TWNTTL	TTL	0	57	43	136	130	1,098	123	120	139	144	1,578	TTL	
	MALAYSIA	TWN14	14"		140	93	80	67	1,140	50	47	55	51	609	14"	
		TWN15	15"		73	74	37	70	762	92	93	85	80	1,050	15"	
		TWN17	17"				7	10	51					0	17"	
		TWNTTL	TTL	0	213	167	124	147	1,953	142	140	140	131	1,659	TTL	
	CHINA	TWN14	14"				10	23	50	249	13	13	13	11	150	14"
		TWN15	15"				3	30	50	249	28	40	49	50	501	15"
		TWN17	17"						0	7	7	8	10	96	17"	
		TWNTTL	TTL	0	0	13	53	100	498	48	60	70	71	747	TTL	
	MEXICO	TWN14	14"						0			5	12	51	14"	
		TWN15	15"						0			6	10	48	15"	
		TWN17	17"						0	3	3	3	8	51	17"	
		TWNTTL	TTL	0	0	0	0	0	0	3	3	14	30	150	TTL	
	TOTAL		14"	14"	0	140	103	103	117	1,389	63	60	73	74	810	14"
			15"	15"	0	103	100	150	200	1,659	190	200	200	200	2,370	15"
			17"	17"	0	27	20	60	60	501	60	60	83	93	888	17"
			19"	19"	0	0	0	0	0	0	3	3	7	9	66	19"
		TTL	TTL	0	270	223	313	377	3,549	316	323	363	376	4,134	TTL	
ACTION	TAIWAN	TWN14	14"					0					0	14"		
		TWN15	15"		5	4	5	4	54					0	15"	
		TWN17	17"		3	3	5	5	48	3	3	3	4	39	17"	
		TWN19	19"						0		1	1	1	9	17"	
		TWN2021	20"21"						0					0	20"21"	
	CHINA	TWNTTL	TTL	0	8	7	10	9	102	3	4	4	5	48	TTL	
		TWN14	14"		7	8	7	7	87	7	6	7	7	81	14"	
		TWN15	15"		3	3	3	4	39	7	8	10	17	126	15"	
		TWN17	17"						0					0	17"	
		TWN19	19"						0					0	17"	
	TOTAL	TWN2021	20"21"						0					0	20"21"	
		TWNTTL	TTL	0	10	11	10	11	126	14	14	17	24	207	TTL	
		14"	14"	0	7	8	7	7	87	7	6	7	7	81	14"	
		15"	15"	0	8	7	8	8	93	7	8	10	17	126	15"	
		17"	17"	0	3	3	5	5	48	3	3	3	4	39	17"	
	TOTAL	19"	19"	0	0	0	0	0	0	0	1	1	1	9	19"	
		20"21"	20"21	0	0	0	0	0	0	0	0	0	0	0	20"21"	
		TTL	TTL	0	18	18	20	20	228	17	18	21	29	255	TTL	
ADI		TAIWAN	TWN14	14"					0					0	14"	
			TWN15	15"		40	40	30	30	420	32	30	26	36	372	15"
	TWN17		17"		75	61	93	110	1,017	57	66	57	54	702	17"	
	TWN19		19"				3	11	42	6	10	17	30	189	17"	
	TWNTTL		TTL	0	115	101	126	151	1,479	95	106	100	120	1,263	TTL	
	THAILAND	TWN14	14"						0					0	14"	
		TWN15	15"		70	60	40	30	600	25	25	24	25	297	15"	
		TWN17	17"		5	12			51	33	34	50	53	510	17"	
		TWNTTL	TTL	0	75	72	40	30	651	58	59	74	78	807	TTL	
	CHINA	TWN14	14"		30	20	20	20	270	60	60	80	80	840	14"	
		TWN15	15"			7	23	37	201	10	15	20	22	201	15"	
		TWN17	17"						0					0	17"	
		TWNTTL	TTL	0	30	27	43	57	471	70	75	100	102	1,041	TTL	
	MEXICO	TWN14	14"						0					0	14"	
		TWN15	15"						0					0	15"	
		TWN17	17"						0			10	20	90	17"	
		TWNTTL	TTL	0	0	0	0	0	0	0	0	10	20	90	TTL	
	TOTAL	14"	14"	0	30	20	20	20	270	60	60	80	80	840	14"	
15"		15"	0	110	107	93	97	1,221	67	70	70	83	870	15"		
17"		17"	0	80	73	93	110	1,068	90	100	117	127	1,302	17"		
19"		19"	0	0	0	3	11	42	6	10	17	30	189	17"		
TTL		TTL	0	220	200	209	238	2,601	223	240	284	320	3,201	TTL		
BRIDGE	TAIWAN	TWN14	14"		8	8	7	7	90	5	5	5	5	60	14"	
		TWN15	15"		8	8	7	9	96	7	7	7	6	81	15"	
		TWN17	17"		4	4	5	5	54	5	3	3	2	39	17"	
		TWNTTL	TTL	0	20	20	19	21	240	17	15	15	13	180	TTL	
	INDONESIA	TWN14	14"		2	2	3	3	30	8	8	8	9	99	14"	
		TWN15	15"		2	2	3	3	30	6	7	7	7	81	15"	
		TWN17	17"						0		2	2	3	21	17"	
		TWNTTL	TTL	0	4	4	6	6	60	14	17	17	19	201	TTL	
	TOTAL	14"	14"	0	10	10	10	10	120	13	13	13	14	159	14"	
		15"	15"	0	10	10	10	12	126	13	14	14	13	162	15"	
		17"	17"	0	4	4	5	5	54	5	5	5	5	60	17"	
		TTL	TTL	0	24	24	25	27	300	31	32	32	32	381	TTL	

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CAPE	TAIWAN	TWN14	14"					0					0	14"		
		TWN15	15"					0					0	15"		
		TWN17	17"		37	33	40	34	432	35	35	35	35	420	17"	
		TWN19	19"				1	3	12	14	10	27	27	234	19"	
		TWN2021	20*21"						0					0	20*21"	
	THAILAND	TWN14	14"		37	33	41	37	444	49	45	62	62	654	TTL	
		TWN15	15"		3				9					0	14"	
		TWN17	17"		40	40	50	50	540	40	40	50	50	540	15"	
		TWN19	19"		30	30	33	40	399	48	48	48	49	579	17"	
		TWN17	17"		73	70	83	90	948	88	88	98	99	1,119	TTL	
TOTAL		14"	14"	0	3	0	0	0	9	0	0	0	0	0	14"	
		15"	15"	0	40	40	50	50	540	40	40	50	50	540	15"	
		17"	17"	0	67	63	73	74	831	83	83	83	84	999	17"	
		19"	19"	0	0	0	1	3	12	14	10	27	27	234	19"	
		20*21"	20*21"	0	0	0	0	0	0	0	0	0	0	0	20*21"	
	TTL	TTL	0	110	103	124	127	1,392	137	133	160	161	1,773	TTL		
CHUNTEX	TAIWAN	TWN14	14"					0					0	14"		
		TWN15	15"		30	30	38	39	411	30	27	25	25	321	15"	
		TWN17	17"		40	40	52	51	549	55	52	67	66	720	17"	
		TWN19	19"						0	3	5	8	13	87	19"	
		TWN17	17"		70	70	90	90	960	88	84	100	104	1,128	TTL	
	THAILAND	TWN14	14"		35	38	60	60	579	60	60	60	60	720	14"	
		TWN15	15"		20	20	38	39	351	53	54	55	55	651	15"	
		TWN17	17"				8	9	51	12	15	16	17	180	17"	
		TWN17	17"		55	58	106	108	981	125	129	131	132	1,551	TTL	
			14"	14"	0	35	38	60	60	579	60	60	60	60	720	14"
TOTAL		15"	15"	0	50	50	76	78	762	83	81	80	80	972	15"	
		17"	17"	0	40	40	60	60	600	67	67	83	83	900	17"	
		19"	19"	0	0	0	0	0	0	3	5	8	13	87	19"	
		20*21"	20*21"	0	0	0	0	0	0	0	0	0	0	0	20*21"	
	TTL	TTL	0	125	128	196	198	1,941	213	213	231	236	2,679	TTL		
CHEER	TAIWAN	TWN14	14"		2	3	4	3	36					0	14"	
		TWN15	15"		2	2	1	0	15					0	15"	
		TWN17	17"		1	1	1	1	12	2	2	3	3	30	17"	
		TWN17	17"	0	5	6	6	4	63	2	2	3	3	30	TTL	
	INDONESIA	TWN14	14"		5	4	4	5	54	6	7	7	5	75	14"	
		TWN15	15"				1	2	9	5	5	5	5	60	15"	
		TWN17	17"		5	4	5	7	63	11	12	12	10	135	TTL	
			14"	14"	0	7	7	8	8	90	6	7	7	5	75	14"
			15"	15"	0	2	2	2	2	24	5	5	5	5	60	15"
TOTAL		17"	17"	0	1	1	1	1	12	2	2	3	3	30	17"	
	TTL	TTL	0	10	10	11	11	126	13	14	15	13	165	TTL		
COMPAL	TAIWAN	TWN14	14"					0					0	14"		
		TWN15	15"		22	21	17	20	240					0	15"	
		TWN17	17"		10	7	16	17	150					0	17"	
		TWN17	17"	0	32	28	33	37	390	0	0	0	0	0	TTL	
	CHINA	TWN14	14"		27	24	23	23	291	34	33	33	33	399	14"	
		TWN15	15"		8	6	16	20	150	50	50	50	50	600	15"	
		TWN17	17"						0	17	20	27	33	291	17"	
		TWN19	19"						0	1	2	2	5	30	19"	
		TWN17	17"	0	35	30	39	43	441	102	105	112	121	1,320	TTL	
TOTAL		14"	14"	0	27	24	23	23	291	34	33	33	33	399	14"	
		15"	15"	0	30	27	33	40	390	50	50	50	50	600	15"	
		17"	17"	0	10	7	16	17	150	17	20	27	33	291	17"	
		19"	19"	0	0	0	0	0	0	1	2	2	5	30	19"	
	TTL	TTL	0	67	58	72	80	831	102	105	112	121	1,320	TTL		
DELTA	TAIWAN	TWN14	14"					0					0	14"		
		TWN15	15"		37	43	37	66	549	27				81	15"	
		TWN17	17"		11	12	18	22	189	20	30	35	47	396	17"	
		TWN19	19"						0			2	6	24	19"	
		TWN17	17"	0	48	55	55	88	738	47	30	37	53	501	TTL	
	THAILAND	TWN14	14"		30	13	20	20	249	20	20	20	20	240	14"	
		TWN15	15"		50	40	70	40	600	60	70	79	75	852	15"	
		TWN17	17"				2	5	21		3	3	4	30	17"	
		TWN17	17"	0	80	53	92	65	870	80	93	102	99	1,122	TTL	
MEXICO	TWN14	14"						0					0	14"		
	TWN15	15"						0					0	15"		
	TWN17	17"						0			5	8	39	17"		
	TWN17	17"	0	0	0	0	0	0	0	0	5	8	39	TTL		
CHINA	TWN14	14"						0					0	14"		
	TWN15	15"						0					0	15"		
	TWN17	17"						0					0	17"		
	TWN17	17"	0					0					0	14"		
		15"	15"	0					0	20	21	25	198	15"		
	TTL	TTL	0	0	0	0	0	0	5	7	7	8	81	17"		
TOTAL		14"	14"	0	30	13	20	20	249	20	20	20	20	240	14"	
		15"	15"	0	87	83	107	106	1,149	87	90	100	100	1,131	15"	
		17"	17"	0	11	12	20	27	210	25	40	50	67	546	17"	
		19"	19"	0	0	0	0	0	0	0	0	2	6	24	19"	
	TTL	TTL	0	128	108	147	153	1,608	132	150	172	193	1,941	TTL		
DTK	CHINA	TWN14	14"					0					0	14"		
		TWN15	15"					0					0	15"		
		TWN17	17"	0	0	0	0	0	0	0	0	0	0	0	TTL	
	TOTAL		14"	14"	0	0	0	0	0	0	0	0	0	0	0	14"
		15"	15"	0	0	0	0	0	0	0	0	0	0	0	15"	
	TTL	TTL	0	0	0	0	0	0	0	0	0	0	0	0	TTL	
FAIR	TAIWAN	TWN14	14"		3				9					0	14"	
		TWN15	15"		3	4	3	3	39					0	15"	
		TWN17	17"		1	1	1	2	15					0	17"	
		TWN17	17"	0	7	5	4	5	63	0	0	0	0	0	TTL	
		TWN14	14"		6	6	6	6	72	5	5	5	5	60	14"	
		TWN15	15"		3	3	3	4	39	5	5	5	5	60	15"	

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INDONESIA	TWN19 TWNITL	19"						0					0	19"		
		TTL	0	9	9	9	10	111	12	12	12	12	144	TTL		
		14"	14"	0	9	6	6	6	81	5	5	5	5	60	14"	
		15"	15"	0	6	7	6	7	78	5	5	5	5	60	15"	
		17"	17"	0	1	1	1	2	15	2	2	2	2	24	17"	
TOTAL		TTL	TTL	0	16	14	13	15	174	12	12	12	12	144	TTL	
FIC	TAIWAN	TWN14	14"					0					0	14"		
		TWN15	15"		7	4	5	6	66	4	3		21	15"		
		TWN17	17"					0	2	2		2	24	17"		
		TWN19	19"					0			1		3	19"		
		TWNITL	TTL	0	7	4	5	6	66	6	5	3	2	48	TTL	
	CHINA	TWN14	14"		4	4	4	4	48	4	4	3	2	39	14"	
		TWN15	15"		3	4	4	4	45	5	7	10	11	99	15"	
		TWNITL	TTL	0	7	8	8	8	93	9	11	13	13	138	TTL	
		14"	14"	0	4	4	4	4	48	4	4	3	2	39	14"	
		15"	15"	0	10	8	9	10	111	9	10	10	11	120	15"	
	TOTAL	17"	17"	0	0	0	0	0	0	2	2	2	2	24	17"	
		19"	19"	0	0	0	0	0	0	0	0	1	0	3	19"	
		TTL	TTL	0	14	12	13	14	159	15	16	16	15	186	TTL	
		PHILIPS	TAIWAN	TWN14	14"		73	77	42	41	699				0	14"
				TWN15	15"		132	115	139	121	1,521	80	73	70	60	849	15"
TWN17	17"				54	67	100	82	909	85	91	99	92	1,101	17"	
TWN19	19"					1	5	20	78	50	60	80	93	849	19"	
TWN2021	20*21"				7	7	8	10	96	3	3	3	7	48	20*21"	
MEXICO	TWNITL		TTL	0	266	267	294	274	3,303	218	227	252	252	2,847	TTL	
	TWN14		14"		55	55	60	63	699	50	40	40	40	510	14"	
	TWN15		15"		28	44	38	40	450	40	60	60	65	675	15"	
	TWN17		17"		13	16	20	51	300	57	77	83	89	918	17"	
	TWN19		19"					0	0	7	15	15	15	111	19"	
HUNGARY	TWNITL		TTL	0	96	115	118	154	1,449	147	184	198	209	2,214	TTL	
	TWN14		14"		35	22	27	16	300	40	40	45	45	510	14"	
	TWN15		15"		30	39	45	53	501	20	45	60	60	555	15"	
	TWN17		17"					0	0	25	35	50	50	480	17"	
	TWN19		19"					0	0		5	8	8	39	19"	
CHINA	TWNITL	TTL	0	65	61	72	69	801	85	120	160	163	1,584	TTL		
	TWN14	14"		37	43	73	80	699	50	50	50	50	600	14"		
	TWN15	15"		27	35	41	47	450	22	50	69	90	693	15"		
	TWN17	17"					0	0	30	35	35	35	300	17"		
	TWNITL	TTL	0	64	78	114	127	1,149	72	130	154	175	1,593	TTL		
BRAZIL	TWN14	14"			10	25	32	201	10	10	15	15	150	14"		
	TWN15	15"				10	23	99	5	5	8	8	78	15"		
	TWNITL	TTL	0	0	10	35	55	300	15	15	23	23	228	TTL		
	14"	14"	0	200	207	227	232	2,598	150	140	150	150	1,770	14"		
	15"	15"	0	217	233	273	284	3,021	167	233	267	283	2,850	15"		
TOTAL	17"	17"	0	67	83	120	133	1,209	167	233	267	266	2,799	17"		
	19"	19"	0	0	1	5	20	78	50	67	100	116	999	19"		
	20*21"	20*21"	0	7	7	8	10	96	3	3	3	7	48	20*21"		
	TTL	TTL	0	491	531	633	679	7,002	537	676	787	822	8,466	TTL		
	SAMPO	TAIWAN	TWN14	14"		17	7	6	3	99	14	13	13	8	144	14"
TWN15			15"		23	19	25	23	270	27	27	27	26	321	15"	
TWN17			17"				3	9	36	5	5	5	5	60	17"	
TWN19			19"						18	1	1	1	1	12	19"	
TWN2021			20*21"		2	1	2	1	18	1	1	1	1	12	20*21"	
PHILIPINE		TWNITL	TTL	0	42	27	36	36	423	47	46	46	40	537	TTL	
		TWN14	14"		20	17	20	20	231	11	11	11	10	129	14"	
		TWN15	15"			10	20	20	150	5	17	20	25	201	15"	
		TWN17	17"						0		3	4	4	21	17"	
		TWNITL	TTL	0	20	27	40	40	381	16	28	34	39	351	TTL	
TOTAL		14"	14"	0	20	17	20	20	231	11	11	11	10	129	14"	
		15"	15"	0	17	17	26	23	249	19	30	33	33	345	15"	
		17"	17"	0	23	19	25	23	270	27	27	30	30	342	17"	
		19"	19"	0	0	0	3	9	36	5	5	5	5	60	19"	
		20*21"	20*21"	0	2	1	2	1	18	1	1	1	1	12	20*21"	
TTL	TTL	0	62	54	76	76	804	63	74	80	79	888	TTL			
TATUNG	TAIWAN	TWN14	14"		60	94	103	106	1,089	60	50	40	37	561	14"	
		TWN15	15"		35	59	63	43	600	60	60	67	70	771	15"	
		TWN17	17"		3	3	3	4	39	1	10	17	26	162	17"	
		TWN19	19"						0				1	3	19"	
		TWN2021	20*21"			1		1	6					0	20*21"	
		TWNITL	TTL	0	98	157	169	154	1,734	121	120	124	134	1,497	TTL	
	THAILAND	TWN14	14"		30	30	30	27	351	9	19	35	35	294	14"	
		TWN15	15"		8	8	20	31	201	14	13	20	19	198	15"	
		TWNITL	TTL	0	38	38	50	58	552	23	32	55	54	492	TTL	
	UK	TWN14	14"		10	9	7	7	99	8	8	8	11	105	14"	
		TWN15	15"						0					0	15"	
		TWNITL	TTL	0	10	9	7	7	99	8	8	8	11	105	TTL	
	MEXICO	TWN14	14"						0		10	10	15	105	14"	
		TWN15	15"						0		10	10	15	105	15"	
		TWNITL	TTL	0	0	0	0	0	0	0	10	10	15	105	TTL	
		14"	14"	0	100	133	140	140	1,539	77	77	83	83	960	14"	
		15"	15"	0	43	67	83	74	801	74	83	97	104	1,074	15"	
	TOTAL	17"	17"	0	3	3	3	4	39	1	10	17	26	162	17"	
		19"	19"	0	0	0	0	0	0	0	0	0	1	3	19"	
		20*21"	20*21"	0	0	1	0	1	6	0	0	0	0	0	20*21"	
		TTL	TTL	0	146	204	226	219	2,385	152	170	197	214	2,199	TTL	
SHINLEE		TAIWAN	TWN14	14"		4	2	4	3	39				0	14"	
	TWN15		15"		2	2	2	2	24				0	15"		
	TWN17		17"				1	2	9	2	2	2	1	21	17"	
	TWN19		19"						0				0	19"		
	TWN2021		20*21"					1	3				1	3	20*21"	
	TWNITL		TTL	0	6	4	7	8	75	2	2	2	2	24	TTL	
	TOTAL	TWN14	14"		5	4	3	4	48	5	5	5	5	60	14"	
		15"	15"													
		17"	17"													
		19"	19"													

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CHINA	TWN15	15"						0	3	3	3	3	36	15"	
	TWN1TL	TTL	0	5	4	3	4	48	8	8	8	8	96	TTL	
	14"	14"	0	9	6	7	7	87	5	5	5	5	60	14"	
	15"	15"	0	2	2	2	2	24	3	3	3	3	36	15"	
	17"	17"	0	0	0	1	2	9	2	2	2	1	21	17"	
	19"	19"	0	0	0	0	0	0	0	0	0	0	0	19"	
	20*21"	20*21	0	0	0	0	1	3	0	0	0	1	3	20*21"	
	TOTAL	TTL	TTL	0	11	8	10	12	123	10	10	10	10	120	TTL
KUOFENG	TAIWAN	TWN14	14"					126	5	3			24	14"	
		TWN15	15"					189	28	17	25	40	330	15"	
		TWN17	17"					195	13	13	20	21	201	17"	
		TWN1TL	TTL	0	39	36	47	48	510	46	33	45	61	555	TTL
	INDONESIA	TWN14	14"						99	10	10	13	14	141	14"
		TWN15	15"						0	5	10	15	20	150	15"
		TWN17	17"						0					0	17"
		TWN1TL	TTL	0	8	8	8	9	99	15	20	28	34	291	TTL
	TOTAL	14"	14"	0	20	18	18	19	225	15	13	13	14	165	14"
		15"	15"	0	17	13	17	16	189	33	27	40	60	480	15"
		17"	17"	0	10	13	20	22	195	13	13	20	21	201	17"
		TTL	TTL	0	47	44	55	57	609	61	53	73	95	846	TTL
LITE-ON	TAIWAN	TWN14	14"					0					0	14"	
		TWN15	15"		45	35	61	45	558	35	23	20	19	291	15"
		TWN17	17"		25	30	45	73	519	61	55	60	61	711	17"
		TWN19	19"					1	3	1	2	7	8	54	19"
	MALAYSIA	TWN2021	20*21"						0					0	20*21"
		TWN1TL	TTL	0	70	65	106	119	1,080	97	80	87	88	1,056	TTL
		TWN14	14"		83	80	77	73	939	57	52	58	58	675	14"
		TWN15	15"		50	50	57	60	651	62	62	73	73	810	15"
	CHINA	TWN17	17"						0			6	9	45	17"
		TWN1TL	TTL	0	133	130	134	133	1,590	119	114	137	140	1,530	TTL
		TWN14	14"		12	12	12	26	186	11	11	10	10	126	14"
		TWN15	15"			10	20	20	150	12	12	23	23	210	15"
	MEXICO	TWN17	17"						0	12	12	13	13	150	17"
		TWN1TL	TTL	0	12	22	32	46	336	35	35	46	46	486	TTL
		TWN14	14"						0		2	7	7	48	14"
		TWN15	15"						0		2	9	15	78	15"
	UK	TWN1TL	TTL	0	0	0	0	0	0	0	4	16	22	126	TTL
		TWN14	14"		5	6	21	51	249	12	8	5	5	90	14"
		TWN15	15"		5	5	12	12	102	8	8	8	10	102	15"
		TWN17	17"						0			8	10	54	17"
	TOTAL	TTL	TTL	0	10	11	33	63	351	20	16	21	25	246	TTL
		14"	14"	0	100	98	110	150	1,374	80	73	80	80	939	14"
		15"	15"	0	100	100	150	137	1,461	117	107	133	140	1,491	15"
		17"	17"	0	25	30	45	73	519	73	67	87	93	960	17"
	TOTAL	19"	19"	0	0	0	0	1	3	1	2	7	8	54	19"
		TTL	TTL	0	225	228	305	361	3,357	271	249	307	321	3,444	TTL

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MAG-TECH	TAIWAN	TWN14	14"		9	6			0					0	14"
		TWN15	15"						45					0	15"
		TWN17	17"		113	98	38	37	858	55	55	60	68	714	17"
		TWN19	19"				33	34	210	10	10	19	18	171	19"
	INDONESIA	TWN2021	20"21"		3	3	2	3	33	2	2	3	3	30	20"21"
		TWNITL	TTL	0	125	110	73	74	1,146	67	67	82	89	915	TTL
		TWN14	14"						0					0	14"
		TWN15	15"		15	10	4	4	99	5	7	16	23	153	15"
	CHINA	TWN17	17"			5	32	30	201	20	25	25	27	291	17"
		TWNITL	TTL	0	15	15	36	34	300	25	32	41	50	444	TTL
		TWN14	14"		19	15	12	10	168	10	10	10	10	120	14"
		TWN15	15"		16	26	22	36	300	28	31	44	44	441	15"
	MEXICO	TWNITL	TTL	0	35	41	34	46	468	38	41	54	54	561	TTL
		TWN14	14"						0					0	14"
		TWN15	15"						0					0	15"
		TWN17	17"						0		2		5	21	17"
	TOTAL	TWN19	19"						0		1		2	9	19"
		TWN2021	20"21"						0					0	20"21"
		TWNITL	TTL	0	0	0	0	0	0	0	0	3	7	30	TTL
		14" 14"	0		19	15	12	10	168	10	10	10	10	120	14"
		15" 15"	0		40	42	26	40	444	33	38	60	67	594	15"
		17" 17"	0		113	103	70	67	1,059	75	80	87	100	1,026	17"
		19" 19"	0		0	3	33	34	210	10	10	20	20	180	19"
		20"21" 20"21"	0		3	3	2	3	33	2	2	3	3	30	20"21"
		TTL	TTL	0	175	166	143	154	1,914	130	140	180	200	1,950	TTL
COVEFORD	CHINA	TWN14	14"		6	7	7	7	81	6	7	7	7	81	14"
		TWN15	15"						0	4	3	3	3	39	15"
		TWN17	17"						0	3	3	4	3	39	17"
		TWNITL	TTL	0	6	7	7	7	81	13	13	14	13	159	TTL
	TOTAL	14" 14"	0		6	7	7	7	81	6	7	7	7	81	14"
		TTL	TTL	0	6	7	7	7	81	13	13	14	13	159	TTL
PRESIDENT	CHINA	TWN14	14"		6	7	7	7	81	2	3	3	3	33	14"
		TWN15	15"		2	2	3	3	30	7	6	6	7	78	15"
		TWN17	17"		2	2	4	5	39	1	1	1	1	12	17"
		TWNITL	TTL	0	10	11	14	15	150	10	10	10	11	123	TTL
	TOTAL	14" 14"	0		6	7	7	7	81	2	3	3	3	33	14"
		15" 15"	0		2	2	3	3	30	7	6	6	7	78	15"
		17" 17"	0		2	2	4	5	39	1	1	1	1	12	17"
		TTL	TTL	0	10	11	14	15	150	10	10	10	11	123	TTL
GVC	TAIWAN	TWN14	14"		12	12	10		0	8	12	8	12	0	14"
		TWN15	15"		2	3	7	13	102	7	8	7	5	120	15"
		TWN17	17"						75					81	17"
		TWN19	19"						0					0	19"
	CHINA	TWNITL	TTL	0	14	15	17	13	177	15	20	15	17	201	TTL
		TWN14	14"		37	40	43	40	480	20	20	20	20	240	14"
		TWN15	15"		5	5	10	40	180	15	15	25	28	249	15"
		TWN17	17"						0	2	6	9	9	51	17"
	TOTAL	TWNITL	TTL	0	42	45	53	80	660	35	37	51	57	540	TTL
		14" 14"	0		37	40	43	40	480	20	20	20	20	240	14"
		15" 15"	0		17	17	20	40	282	23	27	33	40	369	15"
		17" 17"	0		2	3	7	13	75	7	10	13	14	132	17"
		TTL	TTL	0	56	60	70	93	837	50	57	66	74	741	TTL
WYSE	TAIWAN	TWN14	14"		3	3	3	3	36	2	1	2	2	21	14"
		TWN15	15"		10	7	7	8	96	7	7	8	8	90	15"
		TWN17	17"		7	3	7	7	72	6	7	10	10	99	17"
		TWNITL	TTL	0	20	13	17	18	204	15	15	20	20	210	TTL
	TOTAL	14" 14"	0		3	3	3	3	36	2	1	2	2	21	14"
		15" 15"	0		10	7	7	8	96	7	7	8	8	90	15"
TYSTAR	THAILAND	TWN14	14"		5	5	5	5	60					0	14"
		TWN15	15"			1	1	1	9					0	15"
		TWN17	17"		1	1	1	1	12					0	17"
		TWNITL	TTL	0	6	7	7	7	81	0	0	0	0	0	TTL
	TOTAL	14" 14"	0		5	5	5	5	60	0	0	0	0	0	14"
		15" 15"	0		0	1	1	1	9	0	0	0	0	0	15"
ESSEX	TAIWAN	TWN14	14"		13	10	16	17	0					0	14"
		TWN15	15"		2	2	5	8	168	18	18	23	38	291	15"
		TWN17	17"						51					17"	
		TWN19	19"						0			1	2	9	19"
	CHINA	TWNITL	TTL	0	15	12	21	25	219	18	18	24	40	300	TTL
		TWN14	14"		40	33	43	34	450	50	50	47	53	600	14"
		TWN15	15"		17	16	17	17	201	67	50	60	67	732	15"
		TWN17	17"		5	5	5	5	60	5	5	10	13	99	17"
	TOTAL	TWNITL	TTL	0	62	54	65	56	711	122	105	117	133	1,431	TTL
		14" 14"	0		40	33	43	34	450	50	50	47	53	600	14"
		15" 15"	0		30	26	33	34	369	67	50	60	67	732	15"
		17" 17"	0		7	7	10	13	111	23	23	33	51	390	17"
		TTL	TTL	0	77	66	86	81	930	140	123	141	173	1,731	TTL
SHAMROCK	TAIWAN	TWN14	14"		18	18	17	17	210	5	5			30	14"
		TWN15	15"		20	23	33	34	330	25	20	13	8	198	15"
		TWN17	17"		17	13	13	19	186	20	20	18	22	240	17"
		TWN19	19"						0			1	2	9	19"
	MALAYSIA	TWNITL	TTL	0	55	54	63	70	726	50	45	32	32	477	TTL
		TWN14	14"		8	10	10	12	120	22	15	23	23	249	14"
		TWN15	15"						0	5	10	20	32	201	15"
		TWN17	17"						0			5	5	30	17"
	TOTAL	TWNITL	TTL	0	8	10	10	12	120	27	25	48	60	480	TTL

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TOTAL			14"	14"	0	26	28	27	29	330	27	20	23	23	279	14"	
			15"	15"	0	20	23	33	34	330	30	30	33	40	399	15"	
			17"	17"	0	17	13	13	19	186	20	20	23	27	270	17"	
			TTL	TTL	0	63	64	73	82	846	77	70	80	92	957	TTL	
JEAN	TAIWAN	TWN14	14"		13	10	7		90						0	14"	
		TWN15	15"		14	15	20	21	210	30	20	38	22	330	15"		
		TWN17	17"		10	10	13	17	150	17	15	18	17	201	17"		
		TWN19	19"						0			2	2	12	19"		
	TWNTTL	TTL	0	37	35	40	38	450	47	35	58	41	543	TTL			
	MALAYSIA	TWN14	14"		70	63	53	31	651	34	25	25	19	309	14"		
		TWN15	15"		6	5	6	6	69	15	25	25	35	300	15"		
		TWN17	17"						0		2	5	10	51	17"		
		TWNTTL	TTL	0	76	68	59	37	720	49	52	55	64	660	TTL		
	INDONESIA	TWN14	14"			10	30	60	300	33	35	25	30	369	14"		
		TWN15	15"						0	5	15	20	27	201	15"		
		TWNTTL	TTL	0	0	10	30	60	300	38	50	45	57	570	TTL		
			14"	14"	0	83	83	90	91	1,041	67	60	50	49	678	14"	
	TOTAL		15"	15"	0	20	20	26	27	279	50	60	83	84	831	15"	
			17"	17"	0	10	10	13	17	150	17	17	23	27	252	17"	
		TTL	TTL	0	113	113	129	135	1,470	134	137	158	162	1,773	TTL		
ROYAL	TAIWAN	TWN14	14"		8	8	12	15	0		23	13	32	38	0	14"	
		TWN15	15"		27	27	20	20	129	22	27	44	54	318	15"		
		TWN17	17"						282					441	17"		
		TWN19	19"						0		2	2	3	21	19"		
	TWNTTL	TTL	0	35	35	32	35	411	45	42	78	95	780	TTL			
	CHINA	TWN14	14"		28	28	30	30	348	22	22	22	21	261	14"		
		TWN15	15"		25	25	25	25	300	27	27	28	28	330	15"		
		TWN17	17"				7	9	48	5	6	6	6	69	17"		
		TWNTTL	TTL	0	53	53	62	64	696	54	55	56	55	660	TTL		
	TOTAL		14"	14"	0	28	28	30	30	348	22	22	22	21	261	14"	
			15"	15"	0	33	33	37	40	429	50	40	60	66	648	15"	
			17"	17"	0	27	27	27	29	330	27	33	50	60	510	17"	
			19"	19"	0	0	0	0	0	0	0	2	2	3	21	19"	
		TTL	TTL	0	88	88	94	99	1,107	99	97	134	150	1,440	TTL		
TVM	INDONESIA	TWN14	14"		32	20	16	17	255	33	27	27	27	27	342	14"	
		TWN15	15"		7	7	8	8	90	33	26	50	50	477	15"		
		TWN17	17"						0		1	2	2	15	17"		
		TWN19	19"						0					0	19"		
		TWNTTL	TTL	0	39	27	24	25	345	66	54	79	79	834	TTL		
	TOTAL		14"	14"	0	32	20	16	17	255	33	27	27	27	342	14"	
			15"	15"	0	7	7	8	8	90	33	26	50	50	477	15"	
			17"	17"	0	0	0	0	0	0	0	1	2	2	15	17"	
		TTL	TTL	0	39	27	24	25	345	66	54	79	79	834	TTL		
TOPFLY	TAIWAN	TWN14	14"		2	3	3	3	0		3	3	3	4	0	14"	
		TWN15	15"						33					39	15"		
		TWN17	17"						0	1	2	2	2	21	17"		
		TWN19	19"						0					0	19"		
		TWNTTL	TTL	0	2	3	3	3	33	4	5	5	6	60	TTL		
	TOTAL		14"	14"	0	0	0	0	0	0	0	0	0	0	0	14"	
			15"	15"	0	2	3	3	3	33	3	3	3	4	39	15"	
			17"	17"	0	0	0	0	0	0	1	2	2	2	21	17"	
		TTL	TTL	0	2	3	3	3	33	4	5	5	6	60	TTL		
MITAC	TAIWAN	TWN14	14"		5	3	2		0						0	14"	
		TWN15	15"		3	3	3	4	30					0	15"		
		TWN17	17"		3	3	3		39					0	17"		
		TWNTTL	TTL	0	8	6	5	4	69	0	0	0	0	0	TTL		
	CHINA	TWN14	14"		13	10	10	12	135	10	10	10	10	120	14"		
		TWN15	15"		2	3	5	5	45	5	5	5	5	60	15"		
		TWN17	17"						0	3	5	5	5	54	17"		
		TWN19	19"						0					0	19"		
	TWNTTL	TTL	0	15	13	15	17	180	18	20	20	20	234	TTL			
	TOTAL		14"	14"	0	13	10	10	12	135	10	10	10	10	120	14"	
			15"	15"	0	7	6	7	5	75	5	5	5	5	60	15"	
			17"	17"	0	3	3	3	4	39	3	5	5	5	54	17"	
			19"	19"	0	0	0	0	0	0	0	0	0	0	0	19"	
			20*21"	20*21"	0	0	0	0	0	0	0	0	0	0	0	20*21"	
		TTL	TTL	0	23	19	20	21	249	18	20	20	20	234	TTL		
AMTRAN	TAIWAN	TWN14	14"		3	2	4	5	0		5	5	10	12	0	14"	
		TWN15	15"						0					0	15"		
		TWN17	17"						42					96	17"		
		TWN19	19"						0	1	3	7	7	54	19"		
		TWNTTL	TTL	0	3	2	4	5	42	6	8	17	19	150	TTL		
	TOTAL		14"	14"	0	0	0	0	0	0	0	0	0	0	0	14"	
			15"	15"	0	0	0	0	0	0	0	0	0	0	0	15"	
			17"	17"	0	3	2	4	5	42	5	5	10	12	96	17"	
			19"	19"	0	0	0	0	0	0	1	3	7	7	54	19"	
		TTL	TTL	0	3	2	4	5	42	6	8	17	19	150	TTL		
WINWAY	CHINA	TWN14	14"		5	5	6	6	66	5	5	3	3	48	14"		
		TWN15	15"		2	2	2	2	24	3	3	3	4	39	15"		
		TWN17	17"						0	1	2	2	2	21	17"		
		TWNTTL	TTL	0	7	7	8	8	90	9	10	8	9	108	TTL		
	TOTAL		14"	14"	0	5	5	6	6	66	5	5	3	3	48	14"	
			15"	15"	0	2	2	2	2	24	3	3	3	4	39	15"	
			17"	17"	0	0	0	0	0	0	1	2	2	2	21	17"	
		TTL	TTL	0	7	7	8	8	90	9	10	8	9	108	TTL		
AOC	CHINA	TWN14	14"		73	67	73	74	861	73	73	73	74	879	14"		
		TWN15	15"		30	33	34	40	411	47	47	47	46	561	15"		
		TWN17	17"		1	5	13	13	96	23	23	24	23	279	17"		
		TWNTTL	TTL	0	104	105	120	127	1,368	143	143	144	143	1,719	TTL		

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			14"	14"	0	73	67	73	74	861	73	73	73	74	879	14"
			15"	15"	0	30	33	34	40	411	47	47	47	46	561	15"
			17"	17"	0	1	5	13	13	96	23	23	24	23	279	17"
TOTAL			TTL	TTL	0	104	105	120	127	1,368	143	143	144	143	1,719	TTL
SAMSUNG																
KOREA	KOR14	14"				24	25	34	38	363	4	3	3	3	39	14"
	KOR15	15"				130	138	198	264	2,190	162	170	170	170	2,016	15"
	KOR17	17"				190	187	191	220	2,364	205	210	200	200	2,445	17"
	KOR19	19"								0	7	10	15	20	156	19"
	KOR2021	20"21"				7	7	7	7	84	3	5	5	5	54	20"21"
	KORTTL	TTL			0	351	357	430	529	5,001	381	398	393	398	4,710	TTL
MALAYSIA	KOR14	14"				112	112	112	100	1,308	70	70	70	70	840	14"
	KOR15	15"				23	30	40	45	414	90	100	90	90	1,110	15"
	KOR17	17"				5	5	5	5	60	20	25	25	25	285	17"
	KORTTL	TTL			0	140	147	157	150	1,782	180	195	185	185	2,235	TTL
UK	KOR14	14"				28	28	30	32	354					0	14"
	KOR15	15"				40	50	50	50	570	70	70	70	70	840	15"
	KOR17	17"				35	35	30	40	420	30	30	30	30	360	17"
	KORTTL	TTL			0	103	113	110	122	1,344	100	100	100	100	1,200	TTL
MEXICO	KOR14	14"				27	27	25	25	312	15	15	15	15	180	14"
	KOR15	15"				25	25	30	40	360	100	100	100	100	1,200	15"
	KOR17	17"				5	5	10	10	90	19	30	20	20	267	17"
	KORTTL	TTL			0	57	57	65	75	762	134	145	135	135	1,647	TTL
CHINA	KOR14	14"								0	3	13	10	10	108	14"
	KOR15	15"								0	2	10	15	15	126	15"
	KORTTL	TTL			0	0	0	0	0	0	5	23	25	25	234	TTL
TOTAL		14"	14"	0		191	192	201	195	2,337	92	101	98	98	1,167	14"
		15"	15"	0		218	243	318	399	3,534	424	450	445	445	5,292	15"
		17"	17"	0		235	232	236	275	2,934	274	295	275	275	3,357	17"
		19"	19"	0		0	0	0	0	0	7	10	15	20	156	19"
		20"21"	20"21"	0		7	7	7	7	84	3	5	5	5	54	20"21"
		TTL	TTL	0		651	674	762	876	8,889	800	861	838	843	10,026	TTL

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LG	KOREA	KOR14	14"		52	46	18	1	351	6	9	16	9	120	14"		
		KOR15	15"		217	197	147	140	2,103	105	144	155	135	1,617	15"		
		KOR17	17"		47	47	60	63	651	116	118	130	130	1,482	17"		
		KOR19	19"					5	15	8	12	13	17	150	19"		
		KOR2021	20*21"		2	2	3	3	30					0	20*21"		
	KORTTTL				0	318	292	228	212	3,150	235	283	314	291	3,369	TTL	
	MEXICO	KOR14	14"		11	3	2	2	54					0	14"		
		KOR15	15"			18	33	40	273	77	83	86	90	1,008	15"		
		KOR17	17"			1	25	60	258	48	49	55	55	621	17"		
		KOR19	19"						0	1	7	10	13	93	19"		
		KORTTTL				0	11	22	60	102	585	126	139	151	158	1,722	TTL
	BRAZIL	KOR14	14"		2	12	12	18	132	13	13	13	13	156	14"		
		KOR15	15"				4	4	24	4	7	8	9	84	15"		
		KOR17	17"						0			4	4	24	17"		
		KORTTTL				0	2	12	16	22	156	17	20	25	26	264	TTL
	INDONESIA	KOR14	14"		23	30	41	40	402	48	55	43	43	567	14"		
		KOR15	15"		2	8	28	30	204	12	17	15	15	177	15"		
		KOR17	17"					1	3	4	4	3	3	42	17"		
		KORTTTL				0	25	38	69	71	609	64	76	61	61	786	TTL
	UK	KOR14	14"						0					0	14"		
		KOR15	15"						0					0	15"		
		KOR17	17"						0		8	16	21	135	17"		
		KORTTTL				0	0	0	0	0	0	8	16	21	135	TTL	
	CHINA	KOR14	14"						0			4	5	27	14"		
		KOR15	15"						0			3	5	24	15"		
		KOR17	17"						0					0	17"		
KORTTTL				0	0	0	0	0	0	0	7	10	51	TTL			
TOTAL	V	14"	14"	0	88	91	73	61	939	67	85	88	86	978	14"		
		15"	15"	0	219	223	212	214	2,604	198	251	267	254	2,910	15"		
		17"	17"	0	47	48	85	124	912	168	179	208	213	2,304	17"		
		19"	19"	0	0	0	0	5	15	9	19	23	30	243	19"		
		20*21"	20*21"	0	2	2	3	3	30	0	0	0	0	0	20*21"		
		TTL	TTL	0	356	364	373	407	4,500	442	526	574	567	6,327	TTL		
DAEWOO	KOREA	KOR14	14"		31	35	36	25	381	60	50	50	50	630	14"		
		KOR15	15"		49	70	87	94	900	70	70	70	80	870	15"		
		KOR17	17"		13	12	13	13	153	25	25	30	33	339	17"		
		KOR19	19"						0				2	6	19"		
		KORTTTL				0	93	117	136	132	1,434	155	145	150	165	1,845	TTL
	MEXICO	KOR14	14"		11	23	31	30	285	20	20	20	20	240	14"		
		KOR15	15"		3	3	3	3	36	10	10	15	20	165	15"		
		KORTTTL				0	14	26	34	33	321	30	30	35	40	405	TTL
	CHINA	KOR14	14"		3	3	4	7	51	10	20	20	20	210	14"		
		KOR15	15"						0	5	10	10	10	105	15"		
		KORTTTL				0	3	3	4	7	51	15	30	30	30	315	TTL
	TOTAL	V	14"	14"	0	45	61	71	62	717	90	90	90	90	1,080	14"	
			15"	15"	0	52	73	90	97	936	85	90	95	110	1,140	15"	
			17"	17"	0	13	12	13	13	153	25	25	30	33	339	17"	
			20*21"	20*21"	0	0	1	1	1	9	0	1	1	1	9	20*21"	
			TTL	TTL	0	110	146	174	172	1,806	200	205	215	235	2,565	TTL	
HYUNDAI	KOREA	KOR14	14"		31	31	31	31	372	25	23	22	18	264	14"		
		KOR15	15"		55	55	55	55	660	55	55	55	55	660	15"		
		KOR17	17"		17	18	19	20	222	30	30	30	30	360	17"		
		KOR19	19"						0			1	1	6	19"		
		KOR2021	20*21"			1	1	1	9		1	1	1	9	20*21"		
	KORTTTL				0	103	105	106	107	1,263	110	109	109	105	1,299	TTL	
	TOTAL	V	14"	14"	0	31	31	31	31	372	25	23	22	18	264	14"	
			15"	15"	0	55	55	55	55	660	55	55	55	55	660	15"	
			17"	17"	0	17	18	19	20	222	30	30	30	30	360	17"	
			19"	19"	0	0	0	0	0	0	0	0	1	1	6	19"	
			20*21"	20*21"	0	0	1	1	1	9	0	1	1	1	9	20*21"	
	KORTTTL				0	103	105	106	107	1,263	110	109	109	105	1,299	TTL	
	KDS	KOREA	KOR14	14"		35	42	30	30	411	26	16			126	14"	
			KOR15	15"		35	38	42	45	480	64	67	50	50	693	15"	
			KOR17	17"		24	28	35	39	378	48	57	50	50	615	17"	
KOR19			19"					1	3	1	4	6	7	54	19"		
KOR2021			20*21"				6	5	33	2	3	4	3	36	20*21"		
KORTTTL				0	94	108	113	120	1,305	141	147	110	110	1,524	TTL		
GERMANY		KOR14	14"						0					0	14"		
		KOR15	15"		7	8	7	7	87	2				6	15"		
		KOR17	17"		5	5	5	6	63	1				3	17"		
		KORTTTL				0	12	13	12	13	150	3	0	0	0	9	TTL
TOTAL		V	14"	14"	0	35	42	30	30	411	26	16	0	0	126	14"	
			15"	15"	0	42	46	49	52	567	66	67	50	50	699	15"	
			17"	17"	0	29	33	40	45	441	49	57	50	50	618	17"	
			19"	19"	0	0	0	0	1	3	1	4	6	7	54	19"	
			20*21"	20*21"	0	0	0	6	5	33	2	3	4	3	36	20*21"	
			TTL	TTL	0	106	121	125	133	1,455	144	147	110	110	1,533	TTL	
ORION	KOREA	KOR14	14"		37	42	41	40	480	38	50	50	50	564	14"		
		KOR15	15"		20	25	25	26	288	25	35	35	35	390	15"		
		KOR17	17"		4	5	5	5	57	10	15	17	20	186	17"		
		KORTTTL				0	61	72	71	71	825	73	100	102	105	1,140	TTL
	TOTAL	V	14"	14"	0	37	42	41	40	480	38	50	50	50	564	14"	
			15"	15"	0	20	25	25	26	288	25	35	35	35	390	15"	
			17"	17"	0	4	5	5	5	57	10	15	17	20	186	17"	
			TTL	TTL	0	61	72	71	71	825	73	100	102	105	1,140	TTL	
HANSOL	KOREA	KOR14	14"		7	4	4	3	54	6	6	5	5	66	14"		
		KOR15	15"		10	15	11	18	162	12	15	10	10	141	15"		
		KOR17	17"		2	4	10	20	108	13	18	20	20	213	17"		
		KOR19	19"						0		1	1	1	9	19"		
	KORTTTL				0	19	23	25	41	324	31	40	36	36	429	TTL	
	TOTAL	V	KOR14	14"			11	18	21	150	28	32	10	10	240	14"	
			KOR15	15"			2	17	20	117	23	24	30	30	321	15"	
			KOR17	17"		1	1			6					0	17"	
TTL			TTL	0	61	72	71	71	825	73	100	102	105	1,140	TTL		

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	THAILAND	KORTTL	TTL	0	1	14	35	41	273	51	56	40	40	561	TTL	
			14"	14"	0	7	15	22	24	34	38	15	15	306	14"	
			15"	15"	0	10	17	28	38	35	39	40	40	462	15"	
			17"	17"	0	3	5	10	20	114	13	18	20	213	17"	
	TOTAL		TTL	TTL	0	20	37	60	82	597	82	96	76	76	990	TTL
ASKA		CHI14	14"		3	3	3	3	36	4	4	4	4	48	14"	
		CHI15	15"		1	1	1	1	12	2	2	2	2	24	15"	
		CHI17	17"						0					0	17"	
		CHI19	19"						0					0	19"	
		CHI2021	20"21"						0					0	20"21"	
	CHINA	CHITTL	TTL	0	4	4	4	4	48	6	6	6	6	72	TTL	
			14"	14"	0	3	3	3	36	4	4	4	4	48	14"	
			15"	15"	0	1	1	1	12	2	2	2	2	24	15"	
	TOTAL		TTL	TTL	0	4	4	4	48	6	6	6	6	72	TTL	
CGC		CHI14	14"		20	17	15	15	201	15	20	20	20	225	14"	
		CHI15	15"				1	2	9	10	15	15	20	180	15"	
		CHI17	17"					1	3	3	3	5	5	48	17"	
		CHI19	19"						0					0	19"	
		CHI2021	20"21"						0					0	20"21"	
	CHINA	CHITTL	TTL	0	20	17	16	18	213	28	38	40	45	453	TTL	
			14"	14"	0	20	17	15	201	15	20	20	20	225	14"	
			15"	15"	0	0	0	1	2	9	10	15	20	180	15"	
	TOTAL		TTL	TTL	0	20	17	16	213	28	38	40	45	453	TTL	
FOUNDER		CHI14	14"		15	15	15	15	180	15	15	15	15	180	14"	
		CHI15	15"		5	5	10	10	90	15	15	15	15	180	15"	
		CHI17	17"						0					0	17"	
	CHINA	CHITTL	TTL	0	20	20	25	25	270	30	30	30	30	360	TTL	
			14"	14"	0	15	15	15	180	15	15	15	15	180	14"	
			15"	15"	0	5	5	10	10	90	15	15	15	180	15"	
	TOTAL		TTL	TTL	0	20	20	25	270	30	30	30	30	360	TTL	
FONTRU		CHI14	14"		5	5	10	10	90	7	7	8	8	90	14"	
		CHI15	15"				5	5	30	7	7	8	8	90	15"	
		CHI17	17"						0					0	17"	
	CHINA	CHITTL	TTL	0	5	5	15	15	120	14	14	16	16	180	TTL	
			14"	14"	0	5	5	10	10	90	7	7	8	90	14"	
			15"	15"	0	0	0	5	5	30	7	7	8	90	15"	
	TOTAL		TTL	TTL	0	5	5	15	120	14	14	16	16	180	TTL	
UNION GARDEN		CHI14	14"		8	7	7	7	87	7	7	7	6	81	14"	
		CHI15	15"		3	3	3	3	36	3	3	3	4	39	15"	
	CHINA	CHITTL	TTL	0	11	10	10	10	123	10	10	10	10	120	TTL	
			14"	14"	0	8	7	7	87	7	7	7	6	81	14"	
			15"	15"	0	3	3	3	36	3	3	3	4	39	15"	
	TOTAL		TTL	TTL	0	11	10	10	123	10	10	10	10	120	TTL	
WESTLAKE		CHI14	14"		3	3	5	5	48	4	4	4	4	48	14"	
		CHI15	15"		3	3	5	5	48	4	4	4	4	48	15"	
		CHI17	17"		15	15	15	15	180	15	15	15	15	180	17"	
	CHINA	CHITTL	TTL	0	21	21	25	25	276	23	23	23	23	276	TTL	
			14"	14"	0	3	3	5	5	48	4	4	4	48	14"	
			15"	15"	0	3	3	5	5	48	4	4	4	48	15"	
	TOTAL		TTL	TTL	0	21	21	25	276	23	23	23	23	276	TTL	
XOCECO		CHI14	14"		10	10	10	10	120	10	10	10	5	105	14"	
		CHI15	15"		2	2	2	2	24	5	5	7	7	72	15"	
		CHI17	17"						0					0	17"	
	CHINA	CHITTL	TTL	0	12	12	12	12	144	15	15	17	12	177	TTL	
			14"	14"	0	10	10	10	120	10	10	10	5	105	14"	
			15"	15"	0	2	2	2	24	5	5	7	7	72	15"	
	TOTAL		TTL	TTL	0	12	12	12	144	15	15	17	12	177	TTL	
SONICA		ASE14	14"						0					0	14"	
		ASE15	15"		10	10			60					0	15"	
		ASE17	17"		7	7	5	5	72	5	5	5	5	60	17"	
		ASE19	19"						0		2	3	3	24	19"	
		ASE2021	20"21"						0					0	20"21"	
	SINGAPORE	ASETTL	TTL	0	17	17	5	5	132	5	7	8	8	84	TTL	
			14"	14"	0	0	0	0	0	0	0	0	0	0	14"	
			15"	15"	0	10	10	0	60	0	0	0	0	0	15"	
	TOTAL		TTL	TTL	0	17	17	5	132	5	7	8	8	84	TTL	
APPLE		ASE14	14"						0					0	14"	
		ASE15	15"						0					0	15"	
		ASE17	17"		25	25	20	20	270	20	20	15	15	210	17"	
	SINGAPORE	ASETTL	TTL	0	25	25	20	20	270	20	20	15	15	210	TTL	
			14"	14"	0	0	0	0	0	0	0	0	0	0	14"	
			15"	15"	0	0	0	0	0	0	0	0	0	0	15"	
			17"	17"	0	25	25	20	270	20	20	15	15	210	17"	
	TOTAL		TTL	TTL	0	25	25	20	270	20	20	15	15	210	TTL	
STESA		ASE14	14"						0					0	14"	
		ASE15	15"						0					0	15"	
		ASE17	17"						0		1	1	3	15	17"	
		ASE19	19"						0					0	19"	
		ASE2021	20"21"		7	7	8	8	90	8	8	8	8	96	20"21"	
	SINGAPORE	ASETTL	TTL	0	7	7	8	8	90	8	8	8	8	111	TTL	
			14"	14"	0	0	0	0	0	0	0	0	0	0	14"	
			15"	15"	0	0	0	0	0	0	0	0	0	0	15"	
			17"	17"	0	0	0	0	0	0	1	1	3	15	17"	
			19"	19"	0	0	0	0	0	0	0	0	0	0	19"	
			20"21"	20"21"	0	7	7	8	90	8	8	8	8	96	20"21"	
	TOTAL		TTL	TTL	0	7	7	8	90	8	8	8	8	111	TTL	

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K.T.TECH	MALAYSIA	ASE14	14"		4	4	4	4	48					0	14"
		ASE15	15"		4	4	4	4	48					0	15"
		ASE TTL	TTL	0	8	8	8	8	96	0	0	0	0	0	TTL
	TOTAL	14"	14"	0	4	4	4	4	48	0	0	0	0	0	14"
		15"	15"	0	4	4	4	4	48	0	0	0	0	0	15"
		TTL	TTL	0	8	8	8	8	96	0	0	0	0	0	TTL
LIKOM	MALAYSIA	ASE14	14"		40	25	25	30	360	25	25	10	10	210	14"
		ASE15	15"		40	10	35	40	375	35	40	40	40	465	15"
		ASE17	17"					3	9					0	17"
	TOTAL	14"	14"	0	40	25	25	30	360	25	25	10	10	210	14"
		15"	15"	0	40	10	35	40	375	35	40	40	40	465	15"
		TTL	TTL	0	80	35	60	73	744	60	65	50	50	675	TTL
GALINDRA	INDONESIA	ASE14	14"		27	37	23	20	321	7	10	10	10	111	14"
		ASE15	15"		10	17	12	10	147	6	6	7	7	78	15"
		ASE TTL	TTL	0	37	54	35	30	468	13	16	17	17	189	TTL
	TOTAL	14"	14"	0	27	37	23	20	321	7	10	10	10	111	14"
		15"	15"	0	10	17	12	10	147	6	6	7	7	78	15"
		TTL	TTL	0	37	54	35	30	468	13	16	17	17	189	TTL
CMC	INDONESIA	ASE14	14"		5	7	1	1	42		1	1	1	9	14"
		ASE15	15"		2	1		1	12				1	3	15"
		ASE TTL	TTL	0	7	8	1	2	54	0	1	1	2	12	TTL
	TOTAL	14"	14"	0	5	7	1	1	42	0	1	1	1	9	14"
		15"	15"	0	2	1	0	1	12	0	0	0	1	3	15"
		TTL	TTL	0	7	8	1	2	54	0	1	1	2	12	TTL
CENTRIN	INDONESIA	ASE14	14"		1	1	1	1	12					0	14"
		ASE TTL	TTL	0	1	1	1	1	12	0	0	0	0	0	TTL
	TOTAL	TTL	TTL	0	1	1	1	1	12	0	0	0	0	0	TTL
HARTONO	INDONESIA	ASE14	14"		1	1			6					0	14"
		ASE TTL	TTL	0	1	1	0	0	6	0	0	0	0	0	TTL
	TOTAL	TTL	TTL	0	1	1	0	0	6	0	0	0	0	0	TTL
METRODATA	INDONESIA	ASE14	14"		10	10	5	3	84	1				3	14"
		ASE TTL	TTL	0	10	10	5	3	84	1	0	0	0	3	TTL
	TOTAL	TTL	TTL	0	10	10	5	3	84	1	0	0	0	3	TTL
NUSANTRA	INDONESIA	ASE14	14"		2	2	2	2	24	1	1			6	14"
		ASE TTL	TTL	0	2	2	2	2	24	1	1	0	0	6	TTL
	TOTAL	TTL	TTL	0	2	2	2	2	24	1	1	0	0	6	TTL

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NOKIA	FINLAND	EUR14	14"					0						0	14"	
		EUR15	15"		12	16	11	18	171					0	15"	
		EUR17	17"		80	83	87	91	1,023	30	35	32	40	411	17"	
		EUR19	19"					2	6	7	9	9	13	114	19"	
		EUR2021	20"21"		9	12	8	7	108	8	10	10	12	120	20"21"	
	EURTTL			TTL	0	101	111	106	118	1,308	45	54	51	65	645	TTL
	HUNGARY	EUR14	14"						0						0	14"
		EUR15	15"						0						0	15"
		EUR17	17"						0	60	67	53	70	750	17"	
		EUR19	19"						0					0	19"	
		EUR2021	20"21"						0					0	20"21"	
EURTTL			TTL	0	0	0	0	0	0	60	67	53	70	750	TTL	
TOTAL	14"	14"	0	0	0	0	0	0	0	0	0	0	0	0	14"	
	15"	15"	0	12	16	11	18	171	0	0	0	0	0	0	15"	
	17"	17"	0	80	83	87	91	1,023	90	102	85	110	1,161	17"		
	19"	19"	0	0	0	0	2	6	7	9	9	13	114	19"		
	20"21"	20"21"	0	9	12	8	7	108	8	10	10	12	120	20"21"		
TTL			TTL	0	101	111	106	118	1,308	105	121	104	135	1,395	TTL	
MICROVITEC	UK	EUR14	14"		1	1			6	1	1	1	1	12	14"	
		EUR15	15"		1	1	1		9	1	2	2	2	21	15"	
		EUR17	17"		1		1	1	9			1		3	17"	
		EUR19	19"						0					0	19"	
		EUR2021	20"21"						0					3	20"21"	
	EURTTL			TTL	0	3	2	2	1	24	2	3	4	4	39	TTL
	TOTAL	14"	14"	0	1	1	0	0	6	1	1	1	1	12	14"	
		15"	15"	0	1	1	1	0	9	1	2	2	2	21	15"	
		17"	17"	0	1	0	1	1	9	0	0	1	0	3	17"	
		19"	19"	0	0	0	0	0	0	0	0	0	0	0	19"	
		20"21"	20"21"	0	0	0	0	0	0	0	0	0	1	3	20"21"	
TTL			TTL	0	3	2	2	1	24	2	3	4	4	39	TTL	
VESTEL	TURKEY	EUR14	14"		3	3	4	3	39	1	1	1	1	12	14"	
		EUR15	15"		3	3	3	4	39	1	2	2	2	21	15"	
		EUR17	17"					1	3			1		3	17"	
		EUR19	19"						0					0	19"	
		EUR2021	20"21"						0					3	20"21"	
	EURTTL			TTL	0	6	6	7	8	81	2	3	4	4	39	TTL
	TOTAL	14"	14"	0	3	3	4	3	39	1	1	1	1	12	14"	
		15"	15"	0	3	3	3	4	39	1	2	2	2	21	15"	
		17"	17"	0	0	0	0	1	3	0	0	1	0	3	17"	
		19"	19"	0	0	0	0	0	0	0	0	0	0	0	19"	
		20"21"	20"21"	0	0	0	0	0	0	0	0	0	1	3	20"21"	
TTL			TTL	0	6	6	7	8	81	2	3	4	4	39	TTL	
MATSUSHITA	JAPAN	JPN14	14"						0					0	14"	
		JPN15	15"						0					0	15"	
		JPN17	17"		130	197	229	167	2,169	110	130	140	140	1,560	17"	
		JPN19	19"						0		5	10	20	105	19"	
		JPN2021	20"21"		35	40	50	30	465	20	20	20	20	240	20"21"	
	JPNNTL			TTL	0	165	237	279	197	2,634	130	155	170	180	1,905	TTL
	TAIWAN	JPN14	14"		12				36					0	14"	
		JPN15	15"		49	47	47	50	579	80	90	100	100	1,110	15"	
		JPNNTL	TTL	0	61	47	47	50	615	80	90	100	100	1,110	TTL	
		14"	14"	0	12	0	0	0	36	0	0	0	0	0	14"	
		15"	15"	0	49	47	47	50	579	80	90	100	100	1,110	15"	
TOTAL	V	17"	17"	0	130	197	229	167	2,169	110	130	140	140	1,560	17"	
		19"	19"	0	0	0	0	0	0	0	5	10	20	105	19"	
		20"21"	20"21"	0	35	40	50	30	465	20	20	20	20	240	20"21"	
		TTL	TTL	0	226	284	326	247	3,249	210	245	270	280	3,015	TTL	
		14"	14"	0	12	0	0	0	36	0	0	0	0	0	14"	
		15"	15"	0	49	47	47	50	579	80	90	100	100	1,110	15"	
HITACHI	JAPAN	JPN14	14"						0					0	14"	
		JPN19	19"			5	28	28	183	20	36	36	36	384	19"	
		JPN2021	20"21"		12	12	12	14	150	12	11	17	17	171	20"21"	
		JPNNTL	TTL	0	12	17	40	42	333	32	47	53	53	555	TTL	
	TAIWAN	JPN17	17"		2	1	1	2	18	2	4	7	7	60	17"	
		JPN19	19"		1	1	1	1	12	3	3	3	4	39	19"	
		JPNNTL	TTL	0	3	2	2	3	30	5	7	10	11	99	TTL	
		14"	14"	0	0	0	0	0	0	0	0	0	0	0	14"	
		15"	15"	0	0	0	0	0	0	0	0	0	0	0	15"	
	TOTAL	V	17"	17"	0	2	1	1	2	18	2	4	7	7	60	17"
			19"	19"	0	1	6	29	29	195	23	39	39	40	423	19"
20"21"			20"21"	0	12	12	12	14	150	12	11	17	17	171	20"21"	
TTL			TTL	0	15	19	42	45	363	37	54	63	64	654	TTL	
14"			14"	0	0	0	0	0	0	0	0	0	0	0	14"	
15"			15"	0	0	0	0	0	0	0	0	0	0	0	15"	
FUJITSU	JAPAN	JPN14	14"		1	1	1	1	12					0	14"	
		JPN15	15"		21	10	15	27	219	26	11	11		144	15"	
		JPN17	17"		60	25	25	40	450	30	20	20	30	300	17"	
		JPN19	19"						0					0	19"	
		JPN2021	20"21"		1	1	1	1	12	1				3	20"21"	
	JPNNTL			TTL	0	83	37	42	69	693	57	31	31	30	447	TTL
	TOTAL	14"	14"	0	1	1	1	1	12	0	0	0	0	0	14"	
		15"	15"	0	21	10	15	27	219	26	11	11	0	144	15"	
		17"	17"	0	60	25	25	40	450	30	20	20	30	300	17"	
		19"	19"	0	0	0	0	0	0	0	0	0	0	0	19"	
		20"21"	20"21"	0	1	1	1	1	12	1	0	0	0	3	20"21"	
TTL			TTL	0	83	37	42	69	693	57	31	31	30	447	TTL	
IIYAMA	JAPAN	JPN14	14"						0					0	14"	
		JPN15	15"						0					0	15"	
		JPN17	17"		34	37	31	40	426	31	43	45	46	492	17"	
		JPN19	19"					3	9	4	3	3	5	45	19"	
		JPN2021	20"21"		7	8	8	8	93	8	9	9	9	105	20"21"	
	JPNNTL			TTL	0	41	45	39	51	528	43	55	57	60	642	TTL
	TOTAL	14"	14"	0	0	0	0	0	0	0	0	0	0	0	14"	
		15"	15"	0	0	0	0	0	0	0	0	0	0	0	15"	
		17"	17"	0	34	37	31	40	426	31	43	45	46	492	17"	
		19"	19"	0				3	9	4	3	3	5	45	19"	
		20"21"	20"21"	0	7	8	8	8	93	8	9	9	9	105	20"21"	
TTL			TTL	0	41	45	39	51	528	43	55	57	60	642	TTL	

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			17"	17"	0	34	37	31	40	426	31	43	45	46	492	17"
			19"	19"	0	0	0	0	3	9	4	3	3	5	45	19"
			20"21"	20"21"	0	7	8	8	8	93	8	9	9	9	105	20"21"
	TOTAL		TTL	TTL	0	41	45	39	51	528	43	55	57	60	642	TTL
TOTOKU	JAPAN	JPN14	14"			2	1	2	1	3	1	1			6	14"
		JPN15	15"			5	5	2	2	21	1	1	1	1	12	15"
		JPN17	17"						6	54	8	10	11	11	120	17"
		JPN19	19"							0					0	19"
		JPN2021	20"21"			4	4	2	4	42	4	4	4	4	48	20"21"
	JPNNTTL	TTL		0		11	10	6	13	120	14	16	16	16	186	TTL
	TAIWAN	JPN14	14"			10	3			0					0	14"
		JPN15	15"							39					0	15"
		JPN17	17"					2	3	15	3	3	8	8	66	17"
		JPNNTTL	TTL	0		10	3	2	3	54	3	3	8	8	66	TTL
		JPN14	14"	14"	0	0	0	0	1	3	1	1	0	0	6	14"
		JPN15	15"	15"	0	12	4	2	2	60	1	1	1	1	12	15"
		JPN17	17"	17"	0	5	5	4	9	69	11	13	19	19	186	17"
		JPN19	19"	19"	0	0	0	0	0	0	0	0	0	0	0	19"
		JPN2021	20"21"	20"21"	0	4	4	2	4	42	4	4	4	4	48	20"21"
		JPNNTTL	TTL	TTL	0	21	13	8	16	174	17	19	24	24	252	TTL
NANAO	JAPAN	JPN14	14"			3	6	8	10	81	3	6	5	4	54	14"
		JPN15	15"			35	35	30	30	390	37	35	35	35	426	15"
		JPN17	17"						3	9	5	5	5	5	60	17"
		JPN19	19"			10	12	11	10	129	8	8	8	8	96	19"
		JPN2021	20"21"			10	12	11	10	129	8	8	8	8	96	20"21"
	JPNNTTL	TTL		0		48	53	49	53	609	53	54	53	52	636	TTL
		JPN14	14"	14"	0	0	0	0	0	0	0	0	0	0	0	14"
		JPN15	15"	15"	0	3	6	8	10	81	3	6	5	4	54	15"
		JPN17	17"	17"	0	35	35	30	30	390	37	35	35	35	426	17"
		JPN19	19"	19"	0	0	0	0	3	9	5	5	5	5	60	19"
		JPN2021	20"21"	20"21"	0	10	12	11	10	129	8	8	8	8	96	20"21"
	JPNNTTL	TTL	TTL	0		48	53	49	53	609	53	54	53	52	636	TTL
SONY	JAPAN	JPN14	14"			20	20	10	8	0	9	15			0	14"
		JPN15	15"			40	40	50	15	174	16	16	17	21	72	15"
		JPN17	17"						4	435	4	5	5	5	210	17"
		JPN19	19"							12					57	19"
		JPN2021	20"21"			80	80	80	60	900	70	63	45	52	690	20"21"
	JPNNTTL	TTL		0		140	140	140	87	1,521	99	99	67	78	1,029	TTL
	SINGAPORE	JPN14	14"			10	10	10	10	0	10	10	10	10	0	14"
		JPN15	15"			3	3	3	3	120	3	3	3	3	120	15"
		JPN17	17"			3	3	3	3	36	3	3	3	3	36	17"
		JPNNTTL	TTL	0		13	13	13	13	156	13	13	13	13	156	TTL
		JPN14	14"			70	70	70	82	0	61	72	25	20	0	14"
	MEXICO	JPN15	15"			110	110	110	105	876	163	182	163	160	534	15"
		JPN17	17"							1,305					2,004	17"
		JPN19	19"							0	2	4	6	6	54	19"
		JPN2021	20"21"			8	8	8	7	93	7	13	33	39	276	20"21"
	JPNNTTL	TTL		0		188	188	188	194	2,274	233	271	227	225	2,868	TTL
	UK	JPN14	14"			20	20	20	19	0	37	34	18	15	0	14"
		JPN15	15"			30	30	30	20	237	37	34	35	42	312	15"
		JPN17	17"							330	1	3	3	4	444	17"
		JPN19	19"			5	5	5	5	0	6	3	1	1	33	19"
		JPN2021	20"21"			5	5	5	5	60	6	3	1	1	33	20"21"
	JPNNTTL	TTL		0		55	55	55	44	627	81	74	57	62	822	TTL
	USA	JPN14	14"			50	50	50	42	0	33	41	44	40	0	14"
		JPN15	15"			40	40	40	44	576	49	67	63	76	474	15"
		JPN17	17"							492					765	17"
		JPN19	19"							0					0	19"
		JPN2021	20"21"							0					0	20"21"
	JPNNTTL	TTL		0		90	90	90	86	1,068	82	108	107	116	1,239	TTL
		JPN14	14"	14"	0	0	0	0	0	0	0	0	0	0	0	14"
		JPN15	15"	15"	0	170	170	160	161	1,983	150	172	97	85	1,512	15"
		JPN17	17"	17"	0	223	223	233	187	2,598	268	302	281	302	3,459	17"
		JPN19	19"	19"	0	0	0	0	4	12	7	12	14	15	144	19"
		JPN2021	20"21"	20"21"	0	93	93	93	72	1,053	83	79	79	92	999	20"21"
	JPNNTTL	TTL	TTL	0		486	486	486	424	5,646	508	565	471	494	6,114	TTL
NHE	JAPAN	JPN14	14"							0					0	14"
		JPN15	15"							0					0	15"
		JPN17	17"			3	3	3	5	42					0	17"
		JPN19	19"							0					0	19"
		JPN2021	20"21"			15	15	10	10	150					0	20"21"
	JPNNTTL	TTL		0		18	18	13	15	192	0	0	0	0	0	TTL
	CHINA	JPN14	14"			40	40	30	35	0	67	67	67	67	804	14"
		JPN15	15"							435					0	15"
		JPN17	17"							0					0	17"
		JPNNTTL	TTL	0		40	40	30	35	435	67	67	67	67	804	TTL
		JPN14	14"			15	15	30	50	330					0	14"
	THAILAND	JPN15	15"							0	15	15	15	15	180	15"
		JPNNTTL	TTL	0		15	15	30	50	330	15	15	15	15	180	TTL
		JPN14	14"			20	20	20		0					0	14"
		JPN15	15"			20	25	25	25	180	20	18	18	18	222	15"
		JPN17	17"							285		4	4	4	36	17"
	MALAYSIA	JPN19	19"							0					0	19"
		JPNNTTL	TTL	0		40	45	45	25	465	20	22	22	22	258	TTL
		JPN14	14"							0					0	14"
		JPN15	15"							0					0	15"
		JPN17	17"			35	35	35	35	420	10	10	10	10	120	17"
	TAIWAN	JPNNTTL	TTL	0		35	35	35	35	420	10	10	10	10	120	TTL
		JPN14	14"							0					0	14"
		JPN15	15"							0					0	15"
		JPN17	17"			35	40	40	40	465	35	35	35	35	420	17"
		JPN19	19"							0					0	19"
	JPN2021	20"21"	20"21"			5	10	10	10	105	10	10	10	10	120	20"21"

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USA	JPN	TTL	0	40	50	50	50	570	45	45	45	45	540	TTL
	JPN14	14"	0					0					0	14"
	JPN15	15"	0					0					0	15"
	JPN17	17"	0					0	5	15	20	25	195	17"
	JPN19	19"	0					0				3	9	19"
	JPN2021	20"21"	0					0					0	20"21"
MEXICO	JPN	TTL	0	0	0	0	0	0	5	15	20	28	204	TTL
	14"	14"	0	15	15	30	50	330	0	0	0	0	0	14"
	15"	15"	0	60	60	50	35	615	82	82	82	82	984	15"
	17"	17"	0	93	103	103	105	1,212	70	78	83	88	957	17"
	19"	19"	0	0	0	0	0	0	0	4	4	7	45	19"
	20"21"	20"21"	0	20	25	20	20	255	10	10	10	10	120	20"21"
TOTAL	V	TTL	0	188	203	203	210	2,412	162	174	179	187	2,106	TTL

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MITSUBISHI	JAPAN	JPN14	14"						0					0	14"		
		JPN15	15"						0					0	15"		
		JPN17	17"	22	13	16	18	16	189	9	8	8	8	99	17"		
		JPN19	19"						0			2	5	21	19"		
		JPN2021	20"21"	12	30	31	34	35	390	31	20	30	30	333	20"21"		
		JPN TTL	TTL	34	43	47	52	51	579	40	28	40	43	453	TTL		
	MALAYSIA	JPN14	14"						0					0	14"		
		JPN15	15"						0					0	15"		
		JPN17	17"					20	60	20	20	20	20	240	17"		
		JPN TTL	TTL	0	0	0	0	20	60	20	20	20	20	240	TTL		
	CHINA	JPN14	14"						0					0	14"		
		JPN15	15"						0					0	15"		
		JPN17	17"					20	60	16	18	18	18	210	17"		
		JPN TTL	TTL	0	0	0	0	20	60	16	18	18	18	210	TTL		
			14"	14"	0	0	0	0	0	0	0	0	0	14"			
			15"	15"	0	0	0	0	0	0	0	0	0	15"			
			17"	17"	22	13	16	18	56	309	45	46	46	549	17"		
			19"	19"	0	0	0	0	0	0	0	2	5	21	19"		
			20"21"	20"21	12	30	31	34	35	390	31	20	30	30	333	20"21"	
TOTAL			V	TTL	TTL	34	43	47	52	91	699	76	66	78	81	903	TTL
SHIRASUNA	INDONESIA	JPN14	14"		13	13	3	2	93	1	1	1	1	12	14"		
		JPN TTL	TTL	0	13	13	3	2	93	1	1	1	1	12	TTL		
	TOTAL		TTL	TTL	0	13	13	3	2	93	1	1	1	1	12	TTL	

SHIRASUNA	INDONESIA	JPN14	14"		13	13	3	2	93	1	1	1	1	12	14"
		JPN TTTL	TTT	0	13	13	3	2	93	1	1	1	1	12	TTT
	TOTAL	TTT	TTT	0	13	13	3	2	93	1	1	1	1	12	TTT

<SUMMARY>

TOTAL BY SIZE			PRODUCTION (KP/M)						PRODUCTION (KP/M)					
			'96	'97					'98					
			4Q	1Q	2Q	3Q	4Q	TTL	1Q	2Q	3Q	4Q	TTL	
	14"	14"	0	1,760	1,717	1,788	1,834	21,297	1,409	1,406	1,395	1,387	16,791	14"
	15"	15"	0	2,099	2,150	2,487	2,702	28,314	2,650	2,851	3,009	3,101	34,833	15"
17"	17"	22	1,636	1,676	1,930	2,086	21,984	2,157	2,404	2,604	2,786	29,850	17"	
19"	19"	0	1	10	74	125	630	157	233	345	431	3,498	19"	
20"21"	20"21	12	249	267	276	241	3,099	204	194	212	233	2,529	20"21"	
TTL	TTL	34	5,745	5,820	6,555	6,988	75,324	6,577	7,080	7,553	7,922	87,393		

TOTAL BY REGION		PRODUCTION (KP/M)						PRODUCTION (KP/M)					
		'96	'97						'98				
		4Q	1Q	2Q	3Q	4Q	TTL	1Q	2Q	3Q	4Q	TTL	
TAIWAN			1,350	1,300	1,545	1,593	17,364	1,326	1,284	1,478	1,571	16,977	14"
KOREA			1,039	1,074	1,109	1,212	13,302	1,126	1,222	1,214	1,210	14,316	15"
JAPAN			561	604	660	578	7,209	468	485	487	512	5,853	17"
CHINA			633	661	821	987	9,306	1,034	1,173	1,311	1,380	14,694	19"
THAILAND			343	327	443	449	4,686	440	472	515	517	5,832	15"
MALAYSIA			698	610	597	605	7,530	617	633	657	672	7,737	17"
INDONESIA			176	204	234	262	2,628	261	292	314	342	3,627	19"
SINGAPORE			62	62	46	46	648	46	49	45	47	561	19"
USA			130	140	140	136	1,638	127	153	152	161	1,779	20"21"
MEXICO			366	408	465	558	5,391	678	801	824	897	9,600	15"
BRAZIL			2	22	51	77	456	32	35	48	49	492	15"
HUNGARY			65	61	72	69	801	145	187	213	233	2,334	17"
UK			181	190	207	237	2,445	211	209	206	223	2,547	19"
GERMANY			12	13	12	13	150	3	0	0	0	9	19"
TURKEY			6	6	7	8	81	2	3	4	4	39	19"
FINLAND			101	111	106	118	1,308	45	54	51	65	645	19"
PHILIPINE			20	27	40	40	381	16	28	34	39	351	20"21"
TOTAL			5,745	5,820	6,555	6,988	75,324	6,577	7,080	7,553	7,922	87,393	

5,745 5,820 6,555 6,988 75,324 6,577 7,080 7,553 7,922 87,393

TOTAL BY NATIONALITY		PRODUCTION (KP/M)							PRODUCTION (KP/M)					
		'96	'97					'98						
		4Q	1Q	2Q	3Q	4Q	TTL	1Q	2Q	3Q	4Q	TTL		
TAIWANESE	TWN14	14"		1,127	1,063	1,155	1,208	13,659	937	895	940	944	11,148	14"
	TWN15	15"		1,072	1,095	1,335	1,431	14,799	1,331	1,401	1,621	1,728	18,243	15"
	TWN17	17"		565	551	720	811	7,941	851	968	1,170	1,279	12,804	17"
	TWN19	19"		0	4	45	78	381	94	120	210	257	2,043	19"
	TWN2021	20"/21"		12	12	12	16	156	6	6	7	12	93	20"/21"
TOTAL	TWNTTL			2,776	2,725	3,267	3,544	36,936	3,219	3,390	3,948	4,220	44,331	
KOREAN	KOR14	14"		434	474	469	443	5,460	372	395	351	341	4,377	14"

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	KOR15	15"		616	682	777	881	8,868	888	987	987	989	11,553	15"
	KOR17	17"		348	353	408	502	4,833	569	619	630	641	7,377	17"
	KOR19	19"		0	0	0	6	18	17	34	46	61	474	19"
	KOR2021	20"/21"		9	10	17	16	156	5	9	10	9	99	20"/21"
TOTAL	KORTTL			1,407	1,519	1,671	1,848	19,335	1,851	2,044	2,024	2,041	23,880	
ASEAN	ASE14	14"		90	87	61	61	897	34	37	21	21	339	14"
	ASE15	15"		66	42	51	55	642	41	46	47	48	546	15"
	ASE17	17"		32	32	25	28	351	25	26	21	23	285	17"
	ASE19	19"		0	0	0	0	0	0	2	3	3	24	19"
	ASE2021	20"/21"		7	7	8	8	90	8	8	8	8	96	20"/21"
TOTAL	ASETTL			195	168	145	152	1,980	108	119	100	103	1,290	
CHINA	CHI14	14"		64	60	65	65	762	62	67	68	62	777	14"
	CHI15	15"		14	14	27	28	249	46	51	54	60	633	15"
	CHI17	17"		15	15	15	16	183	18	18	20	20	228	17"
TOTAL	CHITTL			93	89	107	109	1,194	126	136	142	142	1,638	
JAPANESE	JPN14	14"		41	29	34	54	474	2	2	1	1	18	14"
	JPN15	15"		315	297	282	285	3,537	342	362	296	272	3,816	15"
	JPN17	17"		595	642	674	636	7,641	604	671	676	713	7,989	17"
	JPN19	19"		1	6	29	39	225	39	68	77	97	843	19"
	JPN2021	20"/21"		212	226	231	194	2,589	177	161	177	190	2,115	20"/21"
TOTAL	JPN TTL			1,164	1,200	1,250	1,208	14,466	1,164	1,264	1,227	1,273	14,781	
EUROPEAN	EUR14	14"		4	4	4	3	45	2	2	2	2	24	14"
	EUR15	15"		16	20	15	22	219	2	4	4	4	42	15"
	EUR17	17"		81	83	88	93	1,035	90	102	87	110	1,167	17"
	EUR19	19"		0	0	0	2	6	7	9	9	13	114	19"
	EUR2021	20"/21"		9	12	8	7	108	8	10	10	14	126	20"/21"
TOTAL	EUR TTL			110	119	115	127	1,413	109	127	112	143	1,473	
GRAND TOTAL				5,745	5,820	6,555	6,988	75,324	6,577	7,080	7,553	7,922	87,393	

VERTICAL RATE V	2,773	3,030	3,348	3,441	37,776	3,197	3,642	3,774	3,892	43,515
	48%	52%	51%	49.2%	50.2%	48.6%	51.4%	50.0%	49.1%	49.8%

World Wide Monitor Production Forecast

AS OF APR'98
CRT Sales Marketing Dept.

World Wide Monitor Production Forecast

AS OF APR'98
CRT Sales Marketing Dept.

World Wide Monitor Production Forecast

AS OF APR'98
CRT Sales Marketing Dept.

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CRT Sales Marketing Dept.

World Wide Monitor Production Forecast

AS OF APR'98
CRT Sales Marketing Dept.

17,364
13,302
7,209
9,306
4,686
7,530
2,628
648
1,638
5,391
456
801
2,445
150
81
1,308
381
75,324 75,324

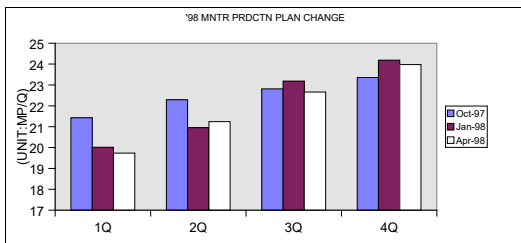
13,659
14,799
7,941
381
156
36,936
5,460

World Wide Monitor Production Forecast

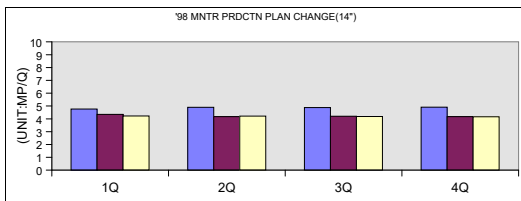
AS OF APR'98
CRT Sales Marketing Dept.

8,868
4,833
18
156
19,335
897
642
351
0
90
1,980
762
249
183
1,194
474
3,537
7,641
225
2,589
14,466
45
219
1,035
6
108
1,413

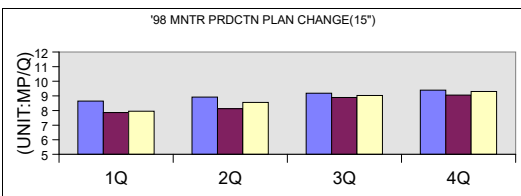
VS PREVIOUS (2)

'98 MNTR PRDCTN PLAN CHANGE

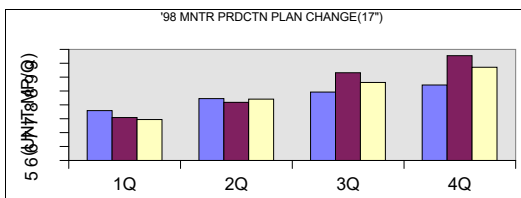
TTL)	1Q	2Q	3Q	4Q	TTL
Oct-97	21.4	22.3	22.8	23.4	89.9
Jan-98	20.0	21.0	23.2	24.2	88.3
Apr-98	19.7	21.2	22.7	24.0	87.6



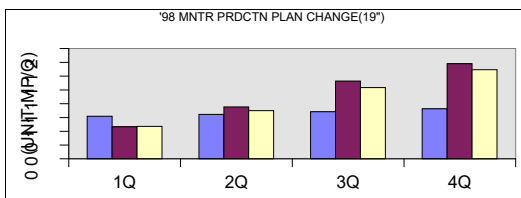
14")	1Q	2Q	3Q	4Q	TTL
Oct-97	4.8	4.9	4.9	4.9	19.4
Jan-98	4.4	4.2	4.2	4.2	16.9
Apr-98	4.2	4.2	4.2	4.2	16.8



15")	1Q	2Q	3Q	4Q	TTL
Oct-97	8.6	8.9	9.2	9.4	36.1
Jan-98	7.9	8.1	8.9	9.1	33.9
Apr-98	8.0	8.6	9.0	9.3	34.8



17")	1Q	2Q	3Q	4Q	TTL
Oct-97	6.8	7.2	7.5	7.7	29.2
Jan-98	6.5	7.1	8.2	8.8	30.6
Apr-98	6.5	7.2	7.8	8.4	29.9



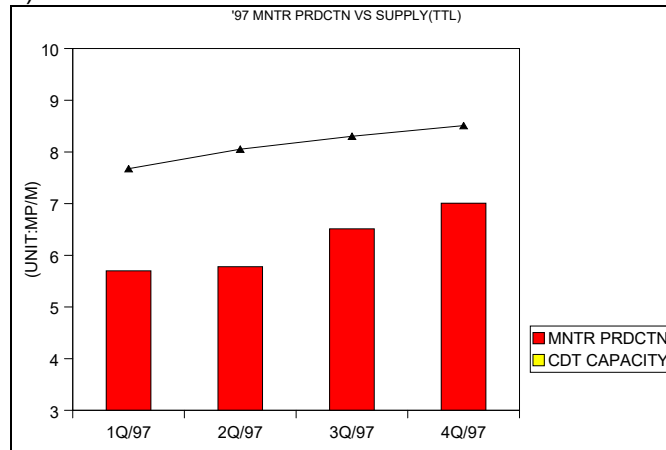
19")	1Q	2Q	3Q	4Q	TTL
Oct-97	0.6	0.6	0.7	0.7	2.7
Jan-98	0.5	0.8	1.1	1.4	3.7
Apr-98	0.5	0.7	1.0	1.3	3.5

2/13/2023

97 MONITOR PRDCTN VS CDT SUPPLY BY SIZE/BY QUA

1)TTL

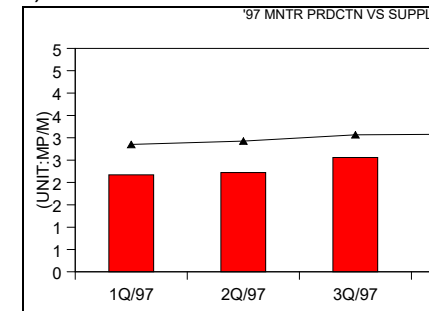
AS OF Oct'97(29th W)



	1Q/97	2Q/97	3Q/97	4Q/97	97TTL
MNTR PRDCTN	5.7	5.8	6.5	7.0	75.0
CDT CAPACITY	7.7	8.1	8.3	8.5	97.6

MNTR VS	2.0	2.3	1.8	1.5	22.6
CDT CAPA	135%	139%	128%	121%	130%

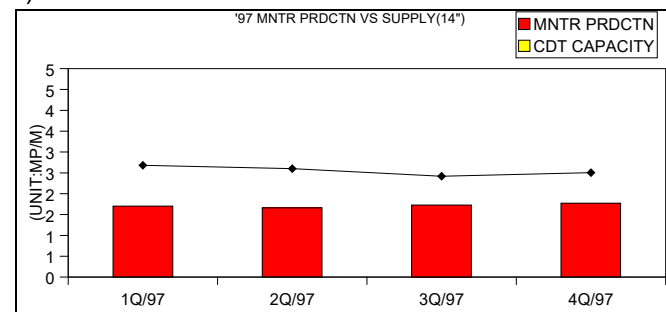
3)15"



	1Q/97	2Q/97
MNTR PRDCTN	2.2	2.2
CDT CAPACITY	2.9	2.9

MNTR VS	0.7	0.7
CDT CAPA	131%	132%

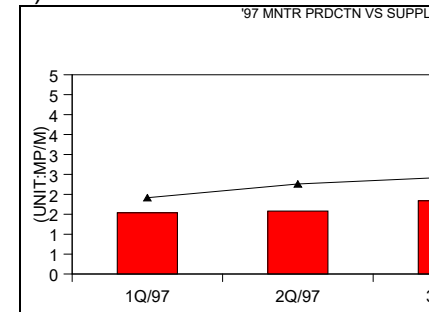
2)14"



	1Q/97	2Q/97	3Q/97	4Q/97	97TTL
MNTR PRDCTN	1.7	1.7	1.7	1.8	20.6
CDT CAPACITY	2.7	2.6	2.4	2.5	30.6

MNTR VS	1.0	0.9	0.7	0.7	10.0
CDT CAPA	158%	157%	140%	141%	149%

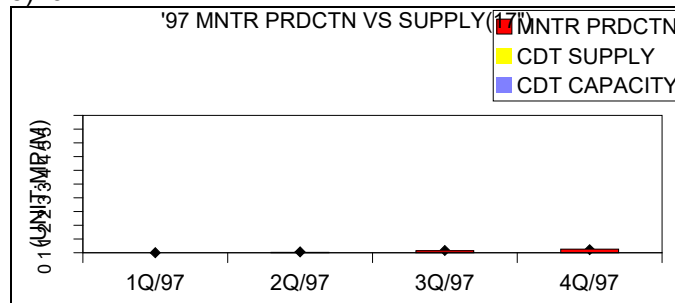
4)17"



	1Q/97	2Q/97
MNTR PRDCTN	1.5	1.6
CDT CAPACITY	1.9	2.3

MNTR VS	0.4	0.7
CDT CAPA	125%	143%

5)19"



	1Q/97	2Q/97	3Q/97	4Q/97	97TTL
MNTR PRDCTN	0.0	0.0	0.1	0.1	0.7
CDT SUPPLY					0.0
CDT CAPACITY	0.0	0.0	0.1	0.1	0.7

MNTR VS	0.0	0.0	-0.1	-0.1	-0.7
CDT SUPPLY	0%	0%	0%	0%	0%

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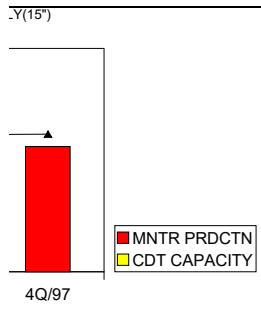
2/13/2023

MNTR VS	0.0	0.0	0.0	0.0	0.0
CDT CAPA	0%	176%	114%	83%	100%

2/13/2023

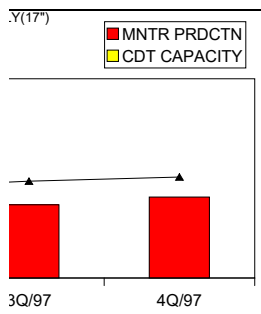
RTER

W-MTG)



3Q/97	4Q/97	97TTL
2.6	2.8	29.3
3.1	3.1	35.8

0.5	0.3	6.5
120%	110%	122%



3Q/97	4Q/97	97TTL
1.8	2.0	21.0
2.4	2.5	27.4

0.6	0.5	6.5
132%	125%	131%

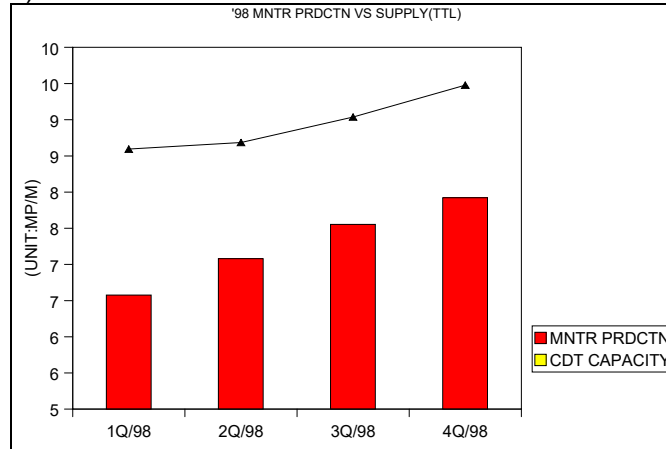
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2/13/2023

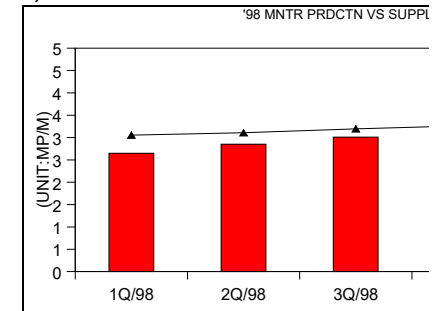
98 MONITOR PRDCTN VS CDT SUPPLY BY SIZE/BY QUA

AS OF APR '98 WW

1)TTL

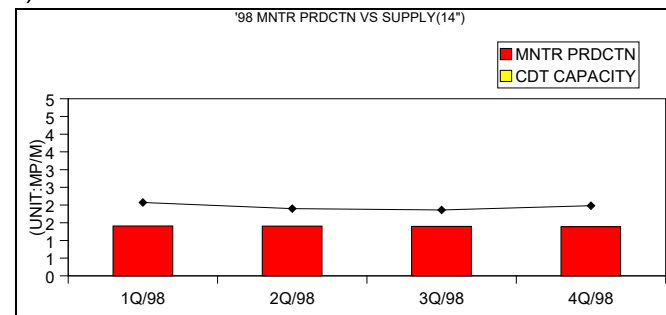
	1Q/98	2Q/98	3Q/98	4Q/98	98TTL
MNTR PRDCTN	6.6	7.1	7.6	7.9	87.4
CDT CAPACITY	8.6	8.7	9.0	9.5	107.4

MNTR VS	2.0	1.6	1.5	1.6	20.0
CDT CAPA	131%	123%	120%	120%	123%

3)15"

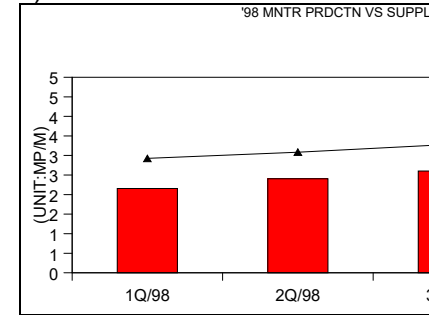
	1Q/98	2Q/98
MNTR PRDCTN	2.7	2.9
CDT CAPACITY	3.1	3.1

MNTR VS	0.4	0.3
CDT CAPA	115%	109%

2)14"

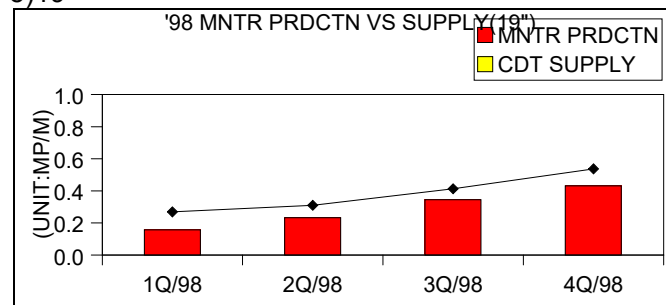
	1Q/98	2Q/98	3Q/98	4Q/98	98TTL
MNTR PRDCTN	1.4	1.4	1.4	1.4	16.8
CDT CAPACITY	2.1	1.9	1.9	2.0	23.4

MNTR VS	0.7	0.5	0.5	0.6	6.6
CDT CAPA	147%	135%	133%	143%	140%

4)17"

	1Q/98	2Q/98
MNTR PRDCTN	2.2	2.4
CDT CAPACITY	2.9	3.1

MNTR VS	0.8	0.7
CDT CAPA	136%	128%

5)19"

	1Q/98	2Q/98	3Q/98	4Q/98	98TTL
MNTR PRDCTN	0.2	0.2	0.3	0.4	3.5
CDT CAPACITY	0.3	0.3	0.4	0.5	4.6

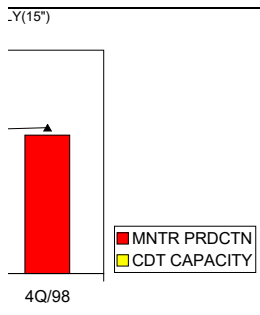
MNTR VS	0.1	0.1	0.1	0.1	1.1
CDT CAPA	171%	133%	120%	125%	131%

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2/13/2023

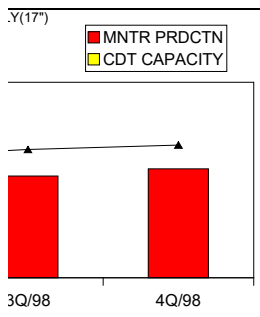
RTER

-MTG



3Q/98	4Q/98	98TTL
3.0	3.1	34.8
3.2	3.3	37.9

0.2	0.2	3.0
106%	105%	109%

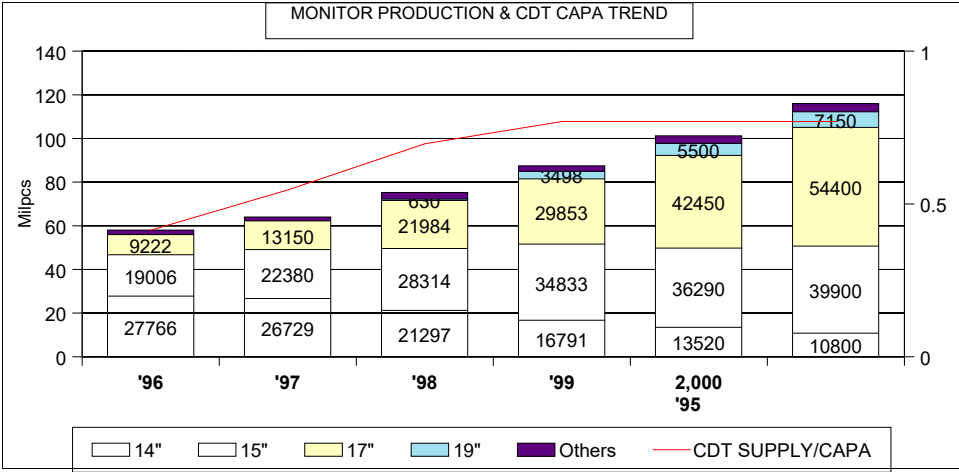


3Q/98	4Q/98	98TTL
2.6	2.8	29.9
3.3	3.4	38.1

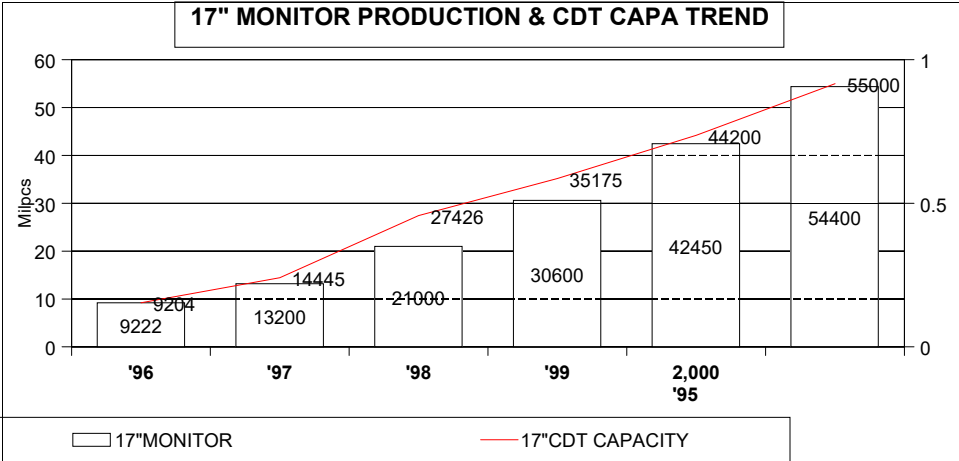
0.7	0.6	8.2
126%	122%	127%

2/13/2023





MNTR PRODUCTION	'95	'96	'97	'98	'99	2,000
14"	27.8	26.7	21.3	16.8	13.5	10.8
15"	19.0	22.4	28.3	34.8	36.3	39.9
17"	9.2	13.2	22.0	29.9	42.5	54.4
19"		0.0	0.6	3.5	5.5	7.2
Others	2.1	1.8	3.1	2.5	3.5	3.7
Total	58.1	64.1	75.3	87.5	101.3	116.0
CDT SUPPLY/CAPA	58.0	76.4	97.6	107.8	107.8	107.8

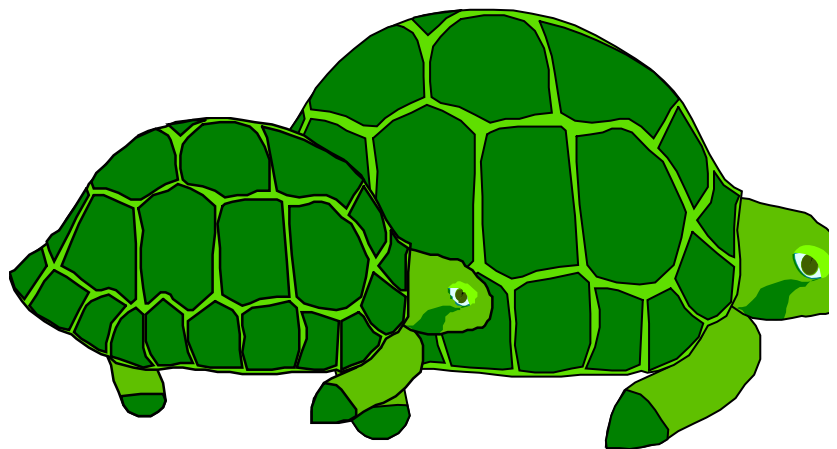


2/13/2023

(UNIT : Milpcs/Yr)						
	'95	'96	'97	'98	'99	2,000
17"MONITOR	9.2	13.2	21.0	30.6	42.5	54.4
17"CDT CAPACITY	9.2	14.4	27.4	35.2	44.2	55.0

CDT & MONITOR DEMAND SUPPLY ANALYSIS

as of April 1998



TOSHIBA
CRT Sales & Marketing Dept.

Components Sales & Marketing Division

Topics of this times' Analysis

*** Demand & Supply**

Demand supply gap becoming moderate but won
Estimated to reach 120% supply in 4Q/'98.

14": Still big gap. Chungwah's several lines stop

15": Demand is strong but, 14" capacity shift may

17": Gap is getting smaller but still 122% in 4Q/'9

19": Monitor production plan still strong. But CDT

*** Monitor production**

- Production plan by QTR is almost equivalent to
- Total Monitor production plan is about same as 88mil sets in 1998.
- Taiwanese monitor shift to overseas very aggre
Especially shift to China is booming.

*** CDT Production**

- Korean new CDT lines suspended.
ex) SDD Brazil, Mexico / LG USA, UK/ Orion M
- 7 to 8 New Lines production starts in '98 (+5mil
Chungwah: UKx1 15", China x2 14"? from 3Q
LG : Gumi x1 17"Flatron
NEC: Teco x1 17" start from end'98
Hitachi: Mobara x1 19"
Toshiba: TDDT x0.5 15", TDD x0.5 17"
(Philips: Hsinchu x1 17"/19"line?)





't balance in '98

ped.

cover the demand.

8.

supply can still cover it.

DQ Desktop Demand
surveyed in Jan.

ssive.

exico
/'98)

EXHIBIT 34

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Interim Lead Counsel for Indirect-Purchaser Plaintiffs

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

IN RE: CATHODE RAY TUBE (CRT)
ANTITRUST LITIGATION

Master File No. CV-07-5944-SC

MDL No. 1917

This Document Relates to:

ALL INDIRECT PURCHASER ACTIONS

**DECLARATION OF JANET S. NETZ, PH.D.,
IN SUPPORT OF MOTION OF INDIRECT-
PURCHASER PLAINTIFFS FOR CLASS
CERTIFICATION**

Date: TBD

Time: TBD

Before: Hon. Charles A. Legge (Ret.)
Special Master

The Honorable Samuel Conti

DOCUMENT SUBMITTED PARTIALLY UNDER SEAL
AND CHAMBERS COPY

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I. Qualifications

I, Janet S. Netz, am a founding partner of applEcon, LLC. I have been a tenured Associate Professor of Economics at Purdue University and a Visiting Associate Professor at the University of Michigan. I received a B.A. (1986) from the University of California, Berkeley, *cum laude*, and an M.A. (1990) and Ph.D. (1992) from the University of Michigan, all in the field of economics. My doctoral fields were Industrial Organization, which is the study of firms and markets, and International Trade, which includes the study of firms and markets in a global environment.

Among the courses that I have taught, those that are most closely related to the issues of this case include Industrial Organization at the undergraduate and doctoral level; Antitrust and Regulation at the undergraduate level; and Microeconomic Theory at the undergraduate and master's level. I have guest lectured on the role of an economic expert in an Alternative Dispute Resolution class at the University of Michigan Law School. I have spoken on the role of economists and economics in class action antitrust cases at several American Bar Association conference programs. My research has focused on competitive interactions of firms and strategies firms can use to increase profits. I have published in peer-reviewed, scholarly journals and have presented my research at many conferences and seminars. I provide my academic employment and publication histories in my curriculum vitae, which is attached as Exhibit A.

I have testified by affidavit or declaration as to class certification or class decertification in ten cases and I have been a consulting expert on class certification or decertification in six cases.¹ I have testified in trial or by affidavit or declaration, especially with regard to the determination of the impact of anti-competitive conduct on consumers and quantifying the magnitude of the impact, for over ten years. In addition, I have consulted on numerous antitrust cases. I provide a list of the cases on which I have testified and consulted in my curriculum vitae, which is attached as Exhibit A.

I am compensated for my work on this case at the rate of \$450 per hour. My compensation is not dependent on my opinions or the outcome of the case.

II. Assignment

Plaintiffs' counsel have asked me to evaluate the economic effects of Defendants' allegedly illegal conduct. In particular, Plaintiffs' counsel has asked me to evaluate whether Defendants' conduct had common or class-wide impact on the members of the proposed class and whether

¹ The cases for which I testified to class certification issues are *Daniel Gordon v. Microsoft*, No. 00-5994 (Minn. Dist. Ct.); *Friedman et. al. v. Microsoft Corp.*, No. CV-2000-000722 (Ariz. Super. Ct.); *In Re Flash Memory Antitrust Litigation*, No. C-07-0086-SB (Northern Dist. Ct. of California); *In Re Graphics Processing Units Antitrust Litigation*, No. M:07-cv-01826-WHA (Northern Dist. Ct. of California); *In re Photochromic Lens Antitrust Litigation*, No. 8:10-md-02173-JDW-EAJ (Middle Dist. Ct. of Florida); *In Re Reformulated Gasoline (RFG) Antitrust & Patent Litigation*; No. 05-1671 CAS (Central Dist. Ct. of California); *In Re TFT-LCD (Flat Panel) Antitrust Litigation*, No. M:07-cv-01827-SI (Northern Dist. Ct. of California); *Joe Comes and Riley Paint, Inc. v. Microsoft Corp.*, CL 82311 (Iowa Dist. Ct.); *Morelock Enterprises Inc. v. Weyerhaeuser Co.*, No. 04-583-PA (Oregon Dist. Ct.); *Pro-Sys Consultations Ltd. v. Microsoft Corporation*, 2008 BCSC 1263 (Supreme Court of British Columbia).

computation of the damages suffered by the class members as a result of Defendants' alleged conduct is susceptible to common proof on a formulaic basis.

I undertake my analysis on the assumption that liability will be proven. That is, I assume that Plaintiffs will prove that Defendants conspired to jointly set the price of CRT tubes, as Plaintiffs allege.

With respect to the second inquiry in my assignment, I discuss methods of estimating damages – and the feasibility of implementing them – in a way that is susceptible to common proof on a formulaic basis. While I have engaged in sufficient investigation to assure myself that such methods are available and feasibly implemented, I have not, at this stage of the proceedings, conducted a full and complete estimate of damages.

My staff, under my guidance, and I have reviewed numerous materials on which I base my conclusions. This material includes documents and data produced in the discovery process of the case, as well as publicly available documents relating to the CRT industry. The latter includes, but is not limited to, company SEC filings, Annual Reports, press releases, CRT and display industry reports, news and journal articles, white papers and presentations from research firms, and CRT-related websites.

To the best of my ability, I have kept track of the materials reviewed. In Exhibits B and C, I provide a list of all confidential and public documents, respectively, that my staff and I have reviewed to date. I reserve the right to revise my conclusions and opinions as more information comes to light.

III. Summary of Plaintiffs' claims

A. Definition of class and sub-classes

The Plaintiffs allege that the price-fixing conspiracy extends from at least 1 March 1995 through 25 November 2007. The proposed State-Wide Classes are defined by Plaintiffs as:

All persons and entities in [Indirect-Purchaser State] who, from March 1, 1995 to November 25, 2007, as residents of [Indirect-Purchaser State], purchased Cathode Ray Tubes incorporated in televisions and monitors in [Indirect-Purchaser State] indirectly from any defendant or subsidiary thereof, or any named affiliate or any named co-conspirator, for their own use and not for resale. Specifically excluded from this Class are defendants; the officers, directors, or employees of any defendant; the parent companies and subsidiaries of any defendant; the legal representatives and heirs or assigns of any defendant; and the named affiliates and co-conspirators. Also excluded are any federal, state, or local governmental entities, any judicial officers presiding over this action, members of their immediate families and judicial staffs, and any juror assigned to this action.²

² 01 October 2012, Memorandum of Points and Authorities in Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division) (Hereinafter "IPPs Memo in Support of Class Cert."), p. 2.

The indirect purchaser states include: Arizona, California, District of Columbia, Florida, Hawaii, Iowa, Kansas, Maine, Michigan, Minnesota, Mississippi, Nebraska, Nevada, New Mexico, New York, North Carolina, North Dakota, South Dakota, Tennessee, Vermont, West Virginia, and Wisconsin. The applicable class period for Hawaii, Nebraska, and Nevada begins from June 25, 2002, July 20, 2002, and February 4, 1999, respectively.³

CRT products are defined as color display tubes (CDTs) which are used in computer monitors, and color picture tubes (CPTs) which are used in TVs. CRT products also include the finished TVs and computer monitors containing CPTs and CDTs, respectively.⁴

The economic analysis that I describe below applies to the nationwide and state classes.⁵ Unless expressed otherwise or the context clearly indicates otherwise, I will refer to the class or class members, meaning both the Nationwide Class and Indirect Purchaser State Classes.

B. Membership of the cartel

The CRT cartel was comprised of the nine Defendants (including LP Displays and Thai CRT, which no longer exist) and six companies Plaintiffs seek to add as defendants (two Thomson entities, three Mitsubishi entities, and Videocon).⁶ Members of the CRT cartel supplied 89.75% of the CRTs worldwide during the period for which market share data are available, 2000 – 2006; see Exhibit 1. CRTs are purchased by manufacturers for use as the display component of televisions and computer monitors.

C. Cartelization of the CRT industry

During the twelve years of the class period,⁷ a cartel monopolized the manufacture of CRTs. The cartel's membership included most of the largest CRT manufacturers. Monopolization of CRTs was effected by a variety of mechanisms: the cartel met to fix prices, with top management in regular attendance and the cartel collusively restricted capacity. Either form of conduct alone is sufficient to raise prices, but successful cartels often employ multiple, redundant strategies. In addition to fixing price and restricting output, the CRT cartel fixed market shares among cartel members; allocated customers to cartel members; shared information, such as capacity and output, not ordinarily shared with competitors; and created opportunities for managers of “competing” companies to build trust through socialization.

³ IPPs Memo in Support of Class Cert. p. 2.

⁴ This excludes certain products that are CRT-based but not in the case (i.e., rear projection products). 11 December 2010, Indirect Purchaser Plaintiffs' Third Consolidated Amended Complaint, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division) (Hereinafter “Complaint”), ¶¶13-15.

⁵ While Plaintiffs seek damages only for the Indirect Purchaser State Classes, the analysis of the existence of common impact and common, formulaic methods for calculating damages are equally applicable to the Nationwide Class.

⁶ Using parent companies for the count: Chunghwa, Daewoo/Orion, Hitachi, IRICO, LPD, MTPD, Samsung, Samtel, and Thai CRT. 22 August 2012, Indirect Purchaser Plaintiffs' Notice of Motion and Motion For Leave to Amend Complaint; Memorandum of Points and Authorities in Support Thereof, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division) (Hereinafter “Proposed Amended Complaint”).

⁷ The CRT cartel's operations spanned the years 1995 through 2007. The class period begins at least as early as March 1, 1995, and ends no earlier than November 25, 2007. Complaint, p. 1.

The cartel set up multilateral meetings of representatives of cartel members it called Glass Meetings, and established three types of meetings, Top Meetings attended by top executives, such as vice presidents and chief operating officers of cartel members, “Management Meetings”, and Working-Level Meetings”. The latter two types of meetings were generally held monthly, and at times as frequently as weekly.⁸ In addition, “Green Meetings” were planned on golf courses to follow Glass Meetings “in order to make friendly contacts and strengthen mutual trust”.⁹

Defendants have produced documents related to Glass Meetings, such as meeting notes taken by representatives of member firms, and documents that appear to have been used at meetings of the cartel, such as meeting agendas and slide presentations. To date, I have found documents related to 100 meetings at which the cartel members discussed and agreed to prices they would charge for CRTs (“fixed prices of CRTs”), spanning the period 15 April 1996 through 9 March 2006; see Exhibit 2 for a list of cartel documents that evidence cartel meetings at which prices were fixed or confirmed.

Documents related to cartel meetings show that cartel members disclosed to each other strategic information not ordinarily revealed to competitors, such as rates of production, prices, and capacity, both current and planned. Each attending member contributed its own production, sales, and pricing information for distribution to the rest of the cartel. Cartel members also gathered information from their customers and distributed it to other cartel members. Industry news and information relevant to setting prices was also discussed at cartel meetings.

As noted above, cartels may raise prices by restricting output. In order to restrict output and raise price, the CRT cartel members frequently agreed to shut down certain production lines, sometimes temporarily, sometimes permanently, and agreed to reduce the length of work days.

⁸ See, e.g.,

- Notes of a meeting between Samsung, Philips, LG Orion and CPT state: “CPT suggested that weekly meeting shall be called to review price increase status, all makers agreed and set a Meeting at CPT Yang MEI factory on 3/27/97 at 9:30 AM, and setup the following dates for future meetings as follows for the time being: 4/2: PH Taipei, 4/9: LG, 4/16: Daewoo 4/23: SDD In order to strengthen communication, ensure price increases to succeed smoothly.” Chunghwa Picture Tubes, LTD, 19 March 1997, Customer Contact Report, CHU00028752 - CHU00028754 at 8753.01E (emphasis supplied).
- “Review of the implementation method of the Working Level weekly meeting: Each maker indicated that because of the success of Glass Meeting, everybody has been Enjoying Business this year. Now that the Slow Season is coming, everybody should continue to strengthen communications and contacts, so the weekly meetings should continue to be held on time.” Chunghwa Picture Tubes, LTD, 09 November 1999, Visitation Report, CHU00030916 - CHU00030918 at 0916.02E (emphasis supplied).

⁹ See, e.g.,

- “[I]n order to make friendly contacts and strengthen mutual trust, the makers agreed that every 3-4 weeks they would take turns to host a Green Meeting (only two members from each maker) after the meeting is over.” Chunghwa Picture Tubes, LTD, 09 November 1999, Visitation Report, CHU00030916 - CHU00030918 at 0916.02E.
- A Green Meeting was held at Country Height Golf Resort on 6 March 1999. Report (Submitted), CHU00021268 - CHU00021276 at 1268.01E.
- A Green Meeting was held at Palm Garden Golf Club on 24 February 2005. Chunghwa Picture Tubes, LTD, 24 February 2005, CHU00661917, CHU00661917 - CHU00661928 at 1917.

The CRT cartel also colluded to divide the CRT market, by a variety of means. The simplest division of the market was an agreement regarding shares of the overall CRT market among cartel members. The cartel also reached agreements by which cartel members were given a share of a particular customer's business, or an exclusive right to certain large customers. Some cartel members were implicitly awarded a larger share of certain large customers. They were authorized to charge them a lower price to that customer than the price allowed to be charged by other suppliers. I give a fuller accounting of the conduct of the CRT cartel below, in Section VIII.A.2.

In the remainder of this report, I show that the conduct of the cartel had a common impact: it raised the prices of CRTs above the competitive level for all direct purchasers, and this overcharge was passed on to all class members in the form of supra-competitive prices for televisions and computer monitors. Moreover, I show how the impact of the cartel's conduct can be quantified in a formulaic way based on common evidence, for both direct purchasers and class members. I begin with a description of the CRT industry.

IV. The economic questions relevant to class certification

I undertake the analysis of the existence of common impact and the feasibility of measuring the damage on a common, formulaic basis in light of product, firm, and industry characteristics. I assume that the Defendants engaged in the conduct described in the Complaint. Based on my analyses, I conclude that (a) common impact to class members exists, in that they paid higher prices for CRTs than they would have in the absence of a cartel, and (b) damages to the class can be calculated using a common, formulaic method.

A. The cartel had a common impact on indirect purchaser class members

To inform my conclusion regarding whether the cartel had an impact, I begin by examining the characteristics of the industry and the cartel. First, I examine the characteristics of the industry and the cartel to determine whether those economic characteristics support the ability of the cartel to increase prices above competitive levels.^{10,11} The relevant characteristics include: the lack of an alternative source of supply of CRT tubes; the existence of barriers to entry; and regular meetings and interactions that allowed the Defendants to exchange information, come to agreements, and monitor cheating. In addition to applying economic principles to the case at hand, I examine the price targets set by the cartel and actual market prices. I find that these prices match very well. Based on these common analyses, conducted using common evidence, I conclude that the cartel had an impact: the cartel increased prices.

Next, I consider the commonality of the impact: did the cartel increase prices to all direct purchasers? I analyze the prices for CRTs to determine whether the prices are related by market forces; that is, is there a structure for CRT prices? If such a price structure exists, then prices for CRTs with different product configurations and sold to different customers would respond in similar ways to a price-fixing conspiracy. I use regression analysis to examine the determinants of CRT prices. I find that over 91% of the variation in prices is determined by common factors.

¹⁰ Throughout this report, I use the term "price increases" and similar terms to mean price increases above their level absent collusion, unless specifically noted otherwise. See the discussion in Section VIII.A.

¹¹ By competitive price, I mean the price that would have existed had the Defendants behaved independently. I do not refer to the price in a perfectly competitive model.

Then, at most 9% of CRT prices can be determined by individual factors. That is, most of the variation in CRT prices is driven by common factors rather than individual ones, and these common influences on price are susceptible to being estimated using a formula.

I then consider whether the higher price imposed on direct purchasers translates into higher prices to indirect purchasers (class members). The effect of an increase in price at the top of the distribution chain (brought about by the increased prices charged by the cartel) on the price to final consumers at the bottom of the distribution chain is called pass-through. I consider the well-accepted and thoroughly developed economic theory of pass-through, which shows that industry-wide cost increases result in higher product prices. I also examine the documentary evidence and find that market participants, the trade press, and market research firms all acknowledge the generalized impact that a change in CRT tube has on CRT monitor and TV prices. Based on the theoretical analysis and the documentary evidence, I conclude that the higher CRT tube prices imposed on direct purchasers as a consequence of the alleged illegal acts translated into higher CRT monitor and TV prices for indirect purchasers. I conclude that the cartel has a common impact on class members: class members face a higher price for CRT monitors and TVs as a result of the cartel.

In short, I conclude that, if Defendants engaged in the alleged conduct, there is common impact: class members pay a higher price for CRT monitors and TVs because of Defendants' conduct.

B. The damages to class members can be measured on a common, formulaic basis

I then consider whether damages can be estimated using common evidence on a common, formulaic basis. To do so, I first consider several methods that could be used to calculate the overcharge to direct purchasers: a regression analysis of the determinants of CRT prices; a benchmark comparison to a proxy for the competitive outcome; a simulation model of prices; and an analysis of the relationship between market power and prices. After considering the applicability of these methods in light of industry characteristics and data availability, I conclude that each of them can be used to estimate the overcharge to direct purchasers of CRT tubes on a common, formulaic basis.

Next, I turn to considering whether the pass-through rate – the degree to which retail prices increase given the overcharge imposed on direct purchasers of CRT tubes – can be measured on a common, formulaic basis. I review data from a variety of firms that manufacture monitors and TVs from CRT tubes and from firms that distribute CRT tubes and CRT monitors and TVs. Based on the pass-through studies that I am able to conduct at this time, I conclude that the extent to which cost changes imposed by Defendants affect the price paid by class members can be quantified using a common, formulaic method. Thus, the overcharge to direct purchasers is fully passed through to indirect purchasers.

Because the overcharge to direct purchasers and the pass-through rate can be determined on a common, formulaic basis, the damages to class members are quantifiable on a common, formulaic basis.

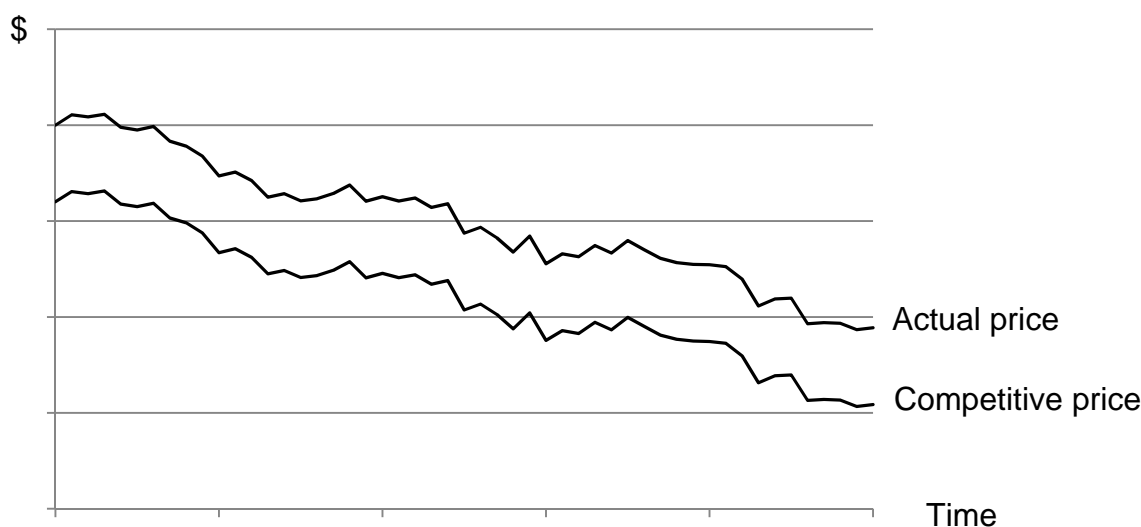
V. The basic economics of cartels

A. Cartel “success” is antitrust harm

A cartel is a group of firms that explicitly coordinates its pricing or output activities. The objective of a cartel is to increase cartel members' prices and profits above the level that would

prevail in the absence of the cartel.¹² Accordingly, I consider a cartel to be “successful” or “effective” if its members are able to charge prices above those that would have prevailed absent the cartel. I call the price that would have prevailed absent the cartel the “competitive price”¹³ or the “but-for price”. A “successful” cartel, as I use the term, necessarily causes antitrust harm.

Causing price to be above the competitive level is often referred to as “raising” price; this terminology can be confusing, especially when observed prices decline over time. The chart below illustrates hypothetical supracompetitive prices that decline over time:



The line in the chart above labeled “actual price” shows the prices that were actually charged by the cartel; they decline over time.¹⁴ The line labeled “competitive price” shows the prices that would have prevailed absent the cartel. The cartel overcharge is the amount by which the actual price is above the competitive price. When I refer to the cartel “raising price”, I mean that the price charged by cartel members is above the competitive price; equivalently, that the cartel imposed an overcharge. As the chart above illustrates, “raising the price above the competitive level” can occur when prices are falling over time: the price “rises” relative to the competitive price, it does not necessarily rise over time.

¹² “In any market, firms have an incentive to coordinate their production and pricing activities to increase their collective and individual profits by restricting market output and raising the market price. An association of firms that explicitly coordinates its pricing or output activities is called a cartel.” Carlton, Dennis, and Jeffery M. Perloff, 2005, *Modern Industrial Organization*, Fourth Edition, Addison-Wesley Longman, Inc., p. 122.

¹³ The “competitive price” is not to be confused with the equilibrium price in a perfectly competitive market. Most markets are not perfectly competitive even if free of monopolizing conduct such as cartelization; the “competitive price” is therefore not, in general, equal to the equilibrium price in a perfectly competitive market.

¹⁴ The cause of the decline in prices is assumed for the purpose of this discussion to be unrelated to the conduct of the cartel. For the purpose at hand, the reason for the decline is immaterial to the point under discussion. In the actual world, prices may decline over time for many reasons unrelated to cartel conduct; for example, prices may decline over time if costs decline over time.

Similarly, “raising price” does not necessarily result in above-normal profit. In certain circumstances, an industry may be subject to below-normal profitability.¹⁵ In such cases, a cartel may eke out merely normal (or even below-normal) profit. Such a cartel is nonetheless successful if it charges a higher price than would exist absent the cartel: making a dollar of profit at the cartel price is better than earning a dime at the competitive price. A cartel has succeeded if the price it charges is above the competitive price.

B. Cartel incentives: monopolization and cheating

1. Cartel success

If all firms in a market join a cartel, then the cartel can function like a monopolist: when cartel members’ conduct is unified, the cartel can control the market price and output like a monopoly, set the monopolist’s profit-maximizing price and output, and collect monopoly profits, as long as cartel profits do not attract entry by others.¹⁶ If fewer than all of the firms in a market form a cartel, or if entry into the market occurs, the cartel can still raise price and earn supra-competitive profits, though not as effectively as a cartel that includes all suppliers in a market in which no entry occurs.

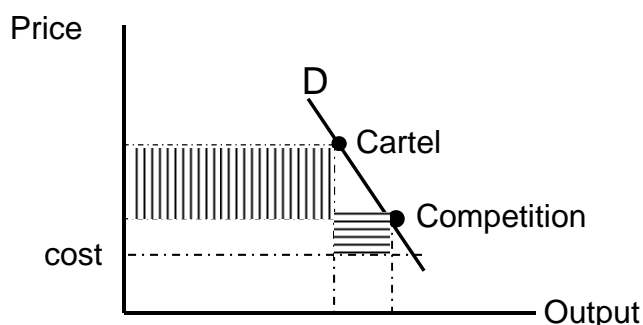
To be successful, a cartel must possess market power. To illustrate, consider a hypothetical cartel that includes all suppliers of paper clips. Consumers may be able to avoid paying cartel overcharges for paper clips by switching to substitutes, such as binder clips and staples, if these other products are supplied by firms outside the cartel. In that case, substitution to these other products would prevent the hypothetical cartel from raising the price of paper clips significantly above the competitive level. If the cartel were broadened to include all suppliers of all paper fastening products, the cartel could prevent substitution away from paper clips to other paper fasteners by raising the prices of all paper fastening products. Only if the cartel controls all sufficiently good substitutes and consumers are willing to pay supra-competitive prices can a cartel raise price above the competitive level. In sum, cartel success requires market power.

Market power is the ability to profitably raise price by restricting output below the competitive level.¹⁷ I illustrate this definition with the aid of the following diagram:

¹⁵ Profit is “normal” if firms earn a rate of return equal to their cost of capital. Long-term sub-normal profitability can occur if industry capacity is substantially in excess of current and probable future demands, and rigidities retard the reallocation of capital to more profitable uses. Below, I show that these conditions prevailed in the CRT industry during the proposed class period; see Section VIII.A.1.c)(2)(a).

¹⁶ “A cartel that includes all firms in a market is in effect a monopoly, and the member firms share the monopoly profits... If a few large firms make most of the sales in a market, and if they coordinate their activities, they can raise price without involving all the other (smaller) firms in the market. For example, Spain and Italy, which controlled 80% of the world’s production of mercury, formed a successful cartel that did not formally involve five other producers.” Carlton, Dennis, and Jeffery M. Perloff, 2005, *Modern Industrial Organization*, Fourth Edition, Addison-Wesley Longman, Inc., pp. 122, 135.

¹⁷ Areeda, Phillip E., Hovenkamp, Herbert, and John L. Solow, 1995, *Antitrust Law: An Analysis of Antitrust Principles and Their Application*, Volume IIA, Little, Brown & Company: Boston, ¶501, p. 85.



In this diagram, price is on the vertical axis and output (quantity) is on the horizontal axis. The sloping line labeled “D” is the market demand curve; it shows, for each price, the amount of output that will be purchased by buyers. In general, buyers will purchase more output at lower prices than at higher prices; equivalently, sellers can extract a higher price when they supply less output. The dashed line labeled “cost” is the cost of producing additional output when output is near the competitive level. The point labeled “Competition” shows the competitive price and the quantity demanded at the competitive price.

If a cartel restricts output below the competitive level, it can charge a higher price because the demand curve is downward sloping; the cartel-restricted combination of price and output is the point on the demand curve labeled “Cartel”. The increase in cartel profit due to the restriction of output is equal to the area shaded vertically (the increase in profit due to charging a higher price) minus the area shaded horizontally (the reduction in profit due to lower sales).

I show that the CRT cartel possessed significant market power in Section VIII.A.1.

a) Restricting output causes price to rise

Because the market demand curve determines price given output (or output given price), there are two fundamental mechanisms by which a cartel can cause price to rise. The first is to simply set prices above the competitive level; this implicitly causes output to be below the competitive level because buyers purchase less output at higher prices (as determined by the demand curve). The second mechanism is to restrict output below the competitive level, which implicitly causes price to be above the competitive level, again as determined by the demand curve. The two mechanisms are equivalent: each causes price to rise. The CRT cartel employed both mechanisms, price setting and output restriction through capacity restriction, to cause price to increase.¹⁸

b) Output can be “restricted” even when it is growing over time

The phrase “restricting output” is subject to the same confusion as the phrase “raising price”. Both “raising” and “restricting” in the context of a cartel refer to comparisons with the competitive level, not to changes over time: output may be “restricted” (below the competitive level) even though it is increasing over time, just as price can be “raised” (above the competitive level) even when it is falling over time. A graph illustrating “restricted” output would look

¹⁸ For example, notes of a cartel meeting say in part, “17” CDT production will stop for 5 days (25 operating days) to adjust the actual production volume in order to maintain the price level.” Samsung SDI, May 1999, Report on the CDT management meeting results (May of ’99), SDCRT-0086632 - SDCRT-0086633 at 6632E, emphasis added. For a more complete description of the CRT cartel’s control of both price and output to cause price to rise, see below at Sections VIII.A.1.a) and VIII.A.1.b)(1).

similar to the graph in the previous V.B.1 section illustrating “raised” price: it would show two lines increasing over time; the higher of the two lines would represent the competitive level of output, and the lower line would be below the actual level (“restricted”), despite the fact that the actual output increases over time.

c) Anticompetitive harm exceeds overcharges

The harm to consumers caused by cartel overcharges is greater than simply the overcharges themselves. As illustrated in the graph above, consumers purchase fewer units of a good at the cartel price than the lower, competitive price. For ease of exposition, suppose that 100 consumers would have purchased one CRT product each at the competitive price, and only 90 consumers bought CRT products at the higher cartel price. Overcharge damages are the harm caused by the cartel to the 90 consumers that bought CRT products at the cartel price. The 10 consumers that did not purchase CRT products at the cartel price were harmed by the cartel, too, and this harm is not included in overcharge damages. They were harmed because they would have preferred to buy a CRT product at the competitive price, but were induced by the cartel overcharge to spend their money on other goods instead.

2. Cartel cheating

Even when a cartel includes all the firms in a market, it differs from a monopoly in that it is comprised of individual firms. Each member of a cartel has two fundamental incentives. One incentive is to cooperate with the cartel’s policies, because unity of action offers the possibility of sharing in monopoly profits. The other incentive is to “cheat” on the cartel agreement, because cheating increases the profits the firm earns. By cheating, a firm gains sales and higher profits in the near term, while enjoying the protection of the cartel from unbridled price competition.¹⁹ These two incentives pull cartel members in opposite directions – to price high and to price low. However, unless cheating is ubiquitous, cartel cheaters’ prices are still above the competitive level. This is because the cartel members that cooperate with cartel policy provide a “price umbrella”: buyers must pay the supra-competitive cartel target price if they don’t buy from cheaters, so cheaters can sell at prices above the competitive level.²⁰

a) Mechanisms to address cheating

Successful cartels develop ways to address members’ incentive to cheat.²¹ Cartel members’ incentive to cheat is constrained to some extent by their incentive to perpetuate the cartel and share in the fruits of monopolization.²² Cartel members may monitor each other for compliance

¹⁹ “[A]lthough it is in the cartel’s best interest for every firm to restrict output [raise price], it is in [each cartel member’s] best interest for [every other cartel member] to restrict output [raise price].” Carlton, Dennis, and Jeffery M. Perloff, 2005, *Modern Industrial Organization*, Fourth Edition, Addison-Wesley Longman, Inc., p. 126.

²⁰ I provide a more formal explanation of why cheaters’ prices are above the competitive level in Section VIII.B.2.

²¹ “Sophisticated cartel organizations are also able to develop multipronged strategies to monitor one another to deter cheating.” Levenstein, Margaret, and Valerie Suslow, March 2006, *What Determines Cartel Success?*, *Journal of Economic Literature*, Vol. 44, 43-95, p. 43.

²² “Following George Stigler (1964), many economists assume that incentive problems undermine attempts by firms to collude to raise prices and restrict output. But the potential profits from collusion can create a powerful incentive as well.” Levenstein, Margaret, and Valerie Suslow, March 2006, *What Determines Cartel Success?*, *Journal of Economic Literature*, Vol. 44, 43-95, p. 43.

with cartel policy regarding pricing and output. Cartels may establish mechanisms for punishing cheaters, such as trigger prices: if a cartel member charges a price below the trigger price, the cartel authorizes a price war to punish the cheater. Excess capacity may be held in order to make credible the threat of a price war. However, price wars and holding excess capacity are expensive for those doling out the punishment as well as for those receiving punishment.²³ Empirical studies find that cartels tend to avoid such expensive strategies by developing methods to monitor each other, encourage cooperation, and physically prevent cheating.²⁴

One efficient mechanism for limiting cheating is to impose restrictions in capacity, such as temporary shut-downs of capacity. Such capacity restrictions are generally easily monitored and commit cartel members to output restrictions, depriving them of opportunities to cheat by limiting their ability to fill orders. Output restrictions, as noted above, cause prices to be above competitive levels.

b) Cheating is not necessarily fatal to cartel success

While some cartels break up due to cheating, many cartels continue to operate in the face of cheating.²⁵ Moreover, cartels can survive episodes of extended price wars to re-establish supra-competitive prices after the price war has subsided.²⁶

c) Whether a cartel succeeds is an empirical question unresolvable by theory or industry characteristics

Whether a cartel will succeed in increasing price above the competitive level is determined by which of the two fundamental incentives dominates, the incentive to monopolize or the incentive to cheat. While economic theory tells us that cartel members are subject to both incentives,

²³ Moreover, there is a contrary view of the role of excess capacity in cartel members' incentives: while holding excess capacity makes the threat of a price war credible, it may also raise the incentive to cheat by reducing marginal cost and thereby raising the profitability of additional sales. One theoretical study finds "support for the *conventional view* that periods of low demand lead, through the emergence of excess capacity, to a breakdown of collusive pricing... a large body of empirical evidence supports this view." Staiger, Robert W., and Frank A. Wolak, 1992, Collusive Pricing with Capacity Constraints in the Presence of Demand Uncertainty, *The RAND Journal of Economics*, Vol. 23(2), 203-220, p. 203.

²⁴ "Although the evidence shows that cartels use a range of punishment mechanisms to deter cheating, including both 'price wars' and side payments, successful cartels do not simply rely on ex post punishments. Instead, they invest in monitoring mechanisms, such as joint sales agencies or regular reporting to one another or third parties. Cartels much prefer to develop the means to monitor each other's behavior in order to deter or physically prevent cheating, rather than resorting to expensive punishments such as price wars." "Successful cartels develop mechanisms for sharing information, making decisions, and manipulating incentives through self-imposed carrots and sticks." Levenstein, Margaret, and Valerie Suslow, March 2006, What Determines Cartel Success?, *Journal of Economic Literature*, Vol. 44, 43-95, pp. 44 and 86.

²⁵ "Cartels break up occasionally because of cheating or lack of effective monitoring, but the biggest challenges cartels face are entry and adjustment of the collusive agreement in response to changing economic conditions." Levenstein, Margaret, and Valerie Suslow, March 2006, What Determines Cartel Success?, *Journal of Economic Literature*, Vol. 44, 43-95, p. 43.

²⁶ "The very successful bromine cartel lasted from 1885 to 1902. During its reign, the average price of bromine was about 25 percent higher than the average in the years before the cartel's formation. There were only three periods of extended price wars over the cartel's roughly 20 year life span... The pool fell apart and the price of potassium bromide (the major bromine product) plunged 45 percent in two months." Carlton, Dennis W., and Jeffrey M. Perloff, 2005, *Modern Industrial Organization*, Fourth Edition, Pearson Addison Wesley, p. 140.

economic theory alone cannot tell us which incentive prevails in a particular situation: whether a cartel succeeds is an empirical question. Certain industry characteristics tend to be correlated with the presence of cartels or with cartel success, but successful cartels exist in industries with a wide variety of characteristics.²⁷ For example, it is often said that cartels are more likely to be found in concentrated industries; yet successful cartels have operated in quite unconcentrated industries.²⁸ Whether a cartel has succeeded is therefore an empirical question that cannot be resolved by examining the characteristics of an industry.

3. Vertically integrated firms profit from upstream cartels

Some members of the CRT cartel were vertically integrated; that is, in addition to making CRTs, some cartel members made CRT TVs and/or CRT computer monitors as well.²⁹ Vertically integrated firms profit from a CRT cartel as do their unintegrated counterparts. For unintegrated firms, the benefit of price-fixing is straightforward: these firms profit by selling tubes at cartel prices rather than lower, competitive prices. Vertically integrated companies also profit by raising the price of CRTs. Economists have studied cartels with vertically integrated firms using sophisticated theoretical models and empirical methods. A recent paper in a prominent scholarly economics journal studied incentives for collusion and vertical integration by firms in upstream markets (exactly the situation in the case at hand), and found that vertical integration facilitates collusion.³⁰ In the model of an industry that is initially unintegrated, at least one firm will vertically integrate in equilibrium, but integration may stop well before all firms are vertically integrated, which helps explain “why a limited degree of vertical merger may be profitable in industries aiming to collude. This is interesting since many industries seem to have the feature that vertically integrated firms compete with separated ones.”³¹ The equilibrium in this model is similar to the structure of the CRT industry, with its mix of vertically-integrated firms and

²⁷ “[M]any economists assume that incentive problems undermine attempts by firms to collude to raise prices and restrict output. But the potential profits from collusion can create a powerful incentive as well. Theory cannot tell us, a priori, which effect will dominate: whether or when cartels succeed is thus an empirical question.” “There is considerable variety in the type of products and industries where collusion appears.” Levenstein, Margaret, and Valerie Suslow, March 2006, What Determines Cartel Success?, *Journal of Economic Literature*, Vol. 44, 43-95, pp. 43 and 57.

²⁸ “[I]ndustry concentration makes collusion easier, both by simplifying the coordination issues and by increasing firms’ gains from collusion. But successful cartels have operated in a wide variety of industries by developing organizations that can overcome these challenges. There are in fact many successful cartels in quite unconcentrated industries, but they almost always rely on industry associations.” Levenstein, Margaret, and Valerie Suslow, March 2006, What Determines Cartel Success?, *Journal of Economic Literature*, Vol. 44, 43-95, p. 44.

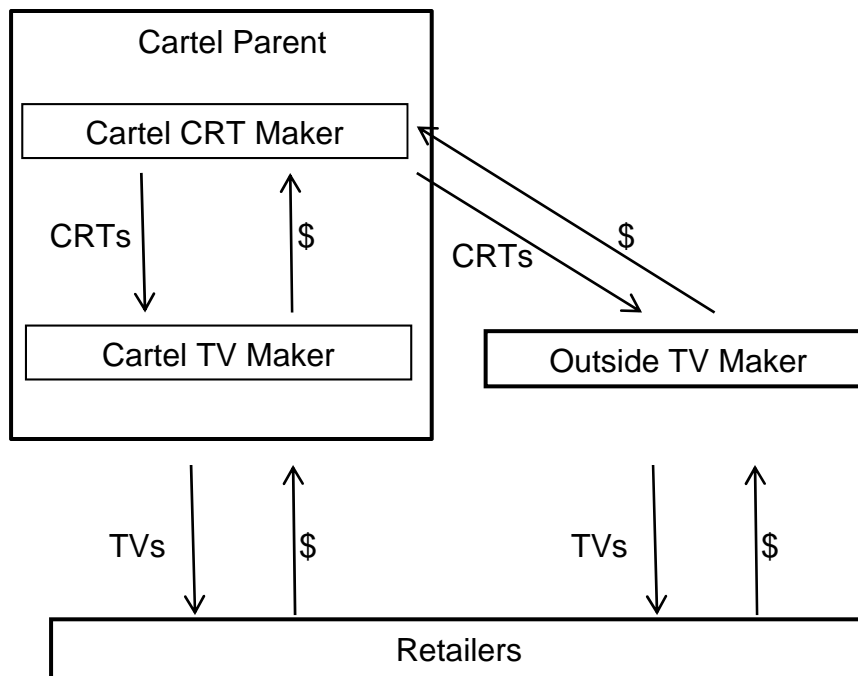
²⁹ For example, before acquiring Thomson’s CRT operations, Videocon produced glass components and CRT televisions. After the acquisition of Thomson’s CRT factory in Anagni, Italy, Videocon was fully vertically integrated from “[s]and to TV.” Videocon, Undated, Videocon International Ltd Welcomes You, PHLP-CRT-035382 at 6. For a description of vertical relationships among cartel members’ subsidiaries, see Section VI.C.3.

³⁰ “In a vertically unintegrated industry, a [single] vertical merger [resulting in a mix of integrated and unintegrated firms, as in the CRT industry] facilitates collusion.” Nocke, Volker, and Lucy White, September 2007, Do Vertical Mergers Facilitate Upstream Collusion?, *The American Economic Review*, Vol. 97(4), 1321-1339, pp. 1329, 1330, 1332.

³¹ Nocke, Volker, and Lucy White, September 2007, Do Vertical Mergers Facilitate Upstream Collusion?, *The American Economic Review*, Vol. 97(4), 1321-1339, p. 1332.

unintegrated firms. Other economic models are also consistent with a cartel comprised of vertically-integrated and unintegrated firms.³²

For ease of exposition, I explain the sources of gain to a vertically-integrated firm using a stylized example. “Cartel Parent” is a CRT cartel member that owns a CRT manufacturing subsidiary called “Cartel CRT Maker”. Cartel CRT Maker sells CRTs to two TV manufacturers, “Cartel TV Maker”, a sister company owned by Cartel Parent, and “Outside TV Maker”, a firm unaffiliated with cartel members. The TV manufacturers engage in horizontal competition in the sale of TVs to retailers. The following diagram illustrates the relationships:



When the cartel raises the price of CRTs, the profitability of the vertically integrated firm is enhanced in at least two ways. First, Cartel Parent receives a supra-competitive price from non-cartel TV manufacturers (Outside TV Maker in the diagram above); this is the same as the mechanism by which unintegrated cartel members profit. The elevated CRT price charged internally (by Cartel CRT Maker to Cartel TV Maker) does not benefit the parent company directly; the money simply goes from one pocket of the parent company to another.

³² Riordan and Salop (1995), for example, explain how instances in which the downstream division of a vertically integrated firm purchases inputs from other input makers – as occurs in the present case – can help monitor the behavior of the upstream manufacturers. “Vertical mergers might be able to increase the likelihood of tacit or express coordinated conduct by facilitating the exchange of pricing and other competitively sensitive information among the competing input suppliers. [footnote: The 1984 DOJ Merger Guidelines offer a related theory of how vertical mergers can facilitate information exchange among competitors. See 1984 DOJ Merger Guidelines §4.221, *supra* note 5, at 20,566-57...] Assuming that the integrated firm does not satisfy all of its input requirements, but rather continues to purchase part of its requirements from other input suppliers, the downstream division will receive price quotes and competitive information from rival input producers. The downstream division can transfer this information to its upstream division.” Riordan, Michael H., and Steven C. Salop, 1995, Evaluating Vertical Mergers: A Post-Chicago Approach, *Antitrust Law Journal*, Vol. 63, pp. 513-568.

The second way the vertically integrated firm benefits from the cartel's elevation of the CRT price is by allowing its TV subsidiary (Cartel TV Maker) to charge a higher price for TVs. When the cartel raises the price of CRTs, the cost of producing TVs rises for unintegrated downstream firms (such as Outside TV Maker in the diagram). Outside TV Maker responds to the cost increase by increasing the prices of its CRT TVs. Cartel TV Maker is a horizontal competitor of Outside TV Maker, so when Outside TV Maker raises its price, Cartel TV Maker raises its television price, too, and earns supracompetitive profit. Consumers face higher CRT TV prices whether they purchase from Cartel TV Maker or Outside TV Maker. Therefore, the cartel price for tubes increases the profit of the vertically-integrated cartel member (Cartel Parent). Vertically integrated CRT-TV or CRT-monitor manufacturers increase profits by joining a cartel in CRTs.

C. Examples of successful cartels

Despite the incentive to cheat and all of the other the difficulties faced by cartels, many do succeed. The success of some legal cartels, such as OPEC and the De Beers diamond cartel, is well known.³³ Legal cartels face many of the same incentive problems, such as the incentive to cheat, as illegal cartels. Economists have, of course, written a great deal about cartels. One study of 51 cartels found that 19 of them were successful.³⁴ A study of 1,120 cartels found a mean overcharge of 15.14% among international cartels after 1973.³⁵

Effective cartels of vertically integrated intermediate goods producers (like the Defendants' cartel) are not only, as I showed above, possible in theory: one study of collusion in industries with vertical integration found that "[m]any famous cases of collusion have involved intermediate goods industries. Further, a significant fraction of those cases involved industries where one or more firms were vertically integrated."³⁶ In a recent example of a cartel of intermediate goods manufacturers, automotive suppliers recently pleaded guilty to fixing the prices of products sold to automobile manufacturers, and paid large fines consistent with significant overcharges.³⁷

³³ OPEC quadrupled the price of oil when it cartelized that industry. See Carlton, Dennis W., and Jeffrey M. Perloff, 2005, *Modern Industrial Organization*, Fourth Edition, Person Addison Wesley, pp. 132-133.

³⁴ "Eckbo (1976) studied 51 formal international cartel organizations in 18 industries, with the earliest agreement in 1918 and the latest in 1964. He defined a cartel as successful if it raised the price at least three times the marginal production cost of the member with the highest cost. Only 19 cartels (37 percent) were successful by this criterion. One of them, the iodine cartel, lasted 61 years. The remaining successful cartels had formal agreements that lasted from 2 to 18 years, with a median lifetime of 5 years and a mean of 6.6 years. Only 5 of the 19 lasted 10 years or longer." Carlton, Dennis, and Jeffery M. Perloff, 2005, *Modern Industrial Organization*, Fourth Edition, Addison-Wesley Longman, Inc., p. 132. Eckbo, Paul L., 1976, *The Future of World Oil*, Cambridge, MA: Ballinger.

³⁵ Boyer, Marcel, and Rachidi Kotchoni, March 2011, *The Econometrics of Cartel Overcharges*, Scientific Series, Table 6, p. 43.

³⁶ The authors cite five economic studies of cartels which are, like Defendants, comprised of intermediate goods producers. Nocke, Volker and Lucy White, September 2007, *Do Vertical Mergers Facilitate Upstream Collusion?*, *The American Economic Review*, Vol. 97(4), 1321-1339, p. 1321. Another paper by a pair of prominent economists analyzes three real-world cartels of vertically integrated intermediate goods producers (none of them duplicated in the previous list of five examples of cartels in intermediate goods). Hart, Oliver, and Jean Tirole, April 1990, *Vertical Integration and Market Foreclosure*, Massachusetts Institute of Technology, pp. 61-71.

³⁷ United States Department of Justice, 30 January 2012, Yazaki Corp., Denso Corp., and Four Yazaki Executives Agree to Plead Guilty to Automobile Parts Price-Fixing and Bid-Rigging Conspiracies, http://www.justice.gov/atr/public/press_releases/2012/279734.htm, accessed 20 September 2012.

A cartel of LCD panel manufacturers was recently found guilty by a U.S. jury of price fixing. LCD panels are flat panel displays used in televisions and computer monitors. The jury found that the cartel succeeded in imposing overcharges of at least \$500 million.³⁸ The LCD industry cartel is instructive for the case at hand in several ways. Both the CRT and LCD cartels operated in large manufacturing industries with economies of scale and large capital requirements. Both industries include a mix of vertically-integrated suppliers that manufacture both displays and the televisions that contain them, and un-integrated suppliers of displays to television and monitor manufacturers. Five members of the LCD cartel were also members of the CRT cartel: Samsung, Toshiba, Hitachi, LG, and Chunghwa Picture Tubes.³⁹

VI. The CRT industry

The cathode ray tube (CRT) is a mature display technology widely used in televisions and computer monitors in the late-1990s and the first decade of the 21st century. CRTs operate by shining an electron beam onto a phosphor-coated panel, causing the phosphors to glow, emitting red, green, and blue light to compose a picture. The CRTs relevant to the present case range in size from 14" to 42".

³⁸ “Following an eight-week trial, a federal jury in San Francisco today convicted the largest Taiwan liquid crystal display (LCD) producer [AU Optronics], its Houston-based subsidiary and their two former top executives for their participation in a five-year conspiracy to fix the prices of thin-film transistor-liquid crystal display (TFT-LCD) panels sold worldwide, the Department of Justice announced. The jury also found that the ill-gotten gain to the conspirators as a result of the fixed sales in the United States was at least \$500 million.” United States Department of Justice, 13 March 2012, Taiwan-Based AU Optronics Corporation, Its Houston-Based Subsidiary and Former Top Executives Convicted For Role in LCD Price-Fixing Conspiracy, http://www.justice.gov/atr/public/press_releases/2012/281032.htm, accessed 20 September 2012.

³⁹ See, e.g.,

- Samsung was found by the European Commission and South Korea’s Fair Trade Commission to have participated in the LCD cartel. See Europa, 08 December 2010, Antitrust: Commission fines six LCD panel producers €648 million for price fixing cartel, <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/1685>, accessed 10 September 2012, and Musil, Steven, 31 October 2011, South Korea fines six LCD makers for price fixing, CNET News, http://news.cnet.com/8301-1001_3-20128181-92/south-korea-fines-six-lcd-makers-for-price-fixing/, accessed 10 September 2012.
- Toshiba was found guilty by a U.S. jury of conspiring to raise LCD prices, and liable for a fine of \$87 million. Musil, Steven, 03 July 2012, Jury finds Toshiba guilty of LCD price-fixing, CNET News, http://news.cnet.com/8301-1023_3-57466274-93/jury-finds-toshiba-guilty-of-lcd-price-fixing/, accessed 10 September 2012.
- Hitachi admitted that it fixed the prices of LCD panels and agreed to pay a fine of \$31 million. United States Department of Justice, 10 March 2009, Hitachi Displays Agrees to Plead Guilty and Pay \$31 Million Fine for Participating in LCD Price-Fixing Conspiracy, <http://www.justice.gov/print/PrintOut2.jsp>, accessed 10 September 2012.
- LG admitted that it fixed the prices of TFT-LCD panels and agreed to pay \$400 million in fines. United States Department of Justice, 12 November 2008, LG, Sharp, Chunghwa Agree to Plead Guilty, Pay Total of \$585 Million in Fines for Participating in LCD price-Fixing Conspiracies, http://www.justice.gov/atr/public/press_releases/2008/239349.htm, accessed 10 September 2012.
- Chunghwa Picture Tubes admitted that it fixed the prices of TFT-LCD panels and agreed to pay a \$65 million fine. *Ibid.*

A. CRT product description

1. Components of CRTs

CRTs operate by shining a beam of electrons on a screen that is coated with material that glows when the electron beam strikes it. The primary components of a CRT are a large glass bulb containing an electron gun and a device near the rear of the bulb that aims the electron gun. The bulb is comprised of two elements. The front of the bulb is called the panel; this is the screen the viewer observes. It is coated on the inside with phosphors that glow when the electron beam strikes them, emitting red, green, or blue light. The remainder of the bulb is called the funnel, because of its funnel shape. The electron gun is housed inside the neck of the funnel. Around the outside of the neck is the deflection yoke. The deflection yoke, sometimes called a deflection coil, aims the electron beam. It scans the electron beam back and forth and up and down across the screen.⁴⁰ The CRT creates a picture by turning the electron gun on and off as the deflection yoke moves the beam across the screen, thereby exciting (illuminating) the appropriate color phosphors in the proper locations to create the full color picture. The “mask” is an additional component inside the bulb, very close to the inside surface of the panel. Its purpose is to absorb stray electrons to ensure that electrons strike only the phosphors that are supposed to be illuminated.

2. Product differentiation

CRTs are differentiated products. The primary dimensions of differentiation are the application, size, shape, finish, and mask type. Additional differentiation comes from different resolutions and the use of various coatings.

CRTs are sold primarily for use in two distinct applications: computer monitors and TVs. CRTs sold for use in monitors are called “color display tubes”, or CDTs;⁴¹ CRTs sold for use in televisions were called “color picture tubes”, or CPTs. While the basic technologies of the two tubes are similar, there are differences between them.⁴² The two types of tubes are not economic

⁴⁰ For a nice cutaway showing the main components of a CRT, see Engelsen, Daniel den, 15 June 2000, Manufacturing of CRTs 1, SDCRT-0202981 at 4.

⁴¹ Philips, and possibly some other firms, at times also refer to these as CMTs (computer monitor tubes). Philips, 12 April 1999, Strategy Review 1999-2003 Region North America, PHLP-CRT-088450 at 86.

⁴² See, e.g.,

- CPTs are designed for high brightness while high resolution is more important for CDTs. Different mask and phosphor structures are used for the two types of tubes. SDI, Undated, Model of SDI CRT Product, SDCRT-0021278 - SDCRT-0021294 at 1288-1289.
- CPTs generally use striped phosphors and aperture grilles or slotted masks, while CDTs use dot phosphors and hexagonal arrangement of openings in the mask. Engelsen, Daniel den, 15 June 2000, Manufacturing of CRTs 1, SDCRT-0202981 at 6 and 12.
- The dot pitch (resolution) of CDTs and CPTs are “totally different”. 03 July 2012, Deposition of Hitachi Electronic Devices (USA) 30(b)(6) Witness Thomas Heiser (Hereinafter “Hitachi 30(b)(6) Deposition of Thomas Heiser, 03 July 2012”), p. 59:16-24.
- The holes in CPT masks were generally stripes while CDTs had small dots to give higher resolution. 09 July 2012, Deposition of LG Electronics 30(b)(6) Witness Mok Hyeon Seong (Hereinafter “LGE 30(b)(6) Deposition of Mok Hyeon Seong, 09 July 2012”), pp. 97:13-98:2.

substitutes: a TV manufacturer would not use a CDT and a monitor manufacturer would not use a CPT.⁴³

The second major type of differentiation is the size of the tubes. The size of the tube is typically measured diagonally across the screen, in either inches or centimeters.⁴⁴ The most common CDT sizes ranged from 14" to 21" during the damages period.⁴⁵ Most CPTs were between 14" and 34" during the damages period.⁴⁶

The aspect ratio, which is the relationship between the width and height of the screen, is another type of differentiation. For most of the relevant period, CRTs used a 4:3 aspect ratio. In the latter part of the relevant period, "widescreen" CRTs started being made. These had an aspect ratio of 16:9.⁴⁷ Widescreen CPTs differ from traditional CPTs in more than just the aspect ratio: widescreen CPTs have both higher resolution and scanning frequencies than traditional CPTs.⁴⁸

⁴³ See, e.g.,

- CPTs lack the resolution to be used in monitors; CDTs cannot handle the power required in a television. 16 July 2012, Deposition of Panasonic Corporation, Panasonic North America and MTPD 30(b)(6) Witness Tatsuo Tobinaga (Hereinafter "Panasonic 30(b)(6) Deposition of Tatsuo Tobinaga, 16 July 2012"), pp. 142:19-143:23.
- CPTs and CDTs have different masks. SDI, Undated, Model of SDI CRT Product, SDCRT-0021278 - SDCRT-0021294 at 1288.
- From Nobuhiko Kobayashi's Deposition: "Q. And when you talked about the differences among the shadow masks and resolution, did that testimony apply equally to CDTs as CPTs? A CPTs and CDTs are entirely different." 17 July 2012, Deposition of Hitachi Displays, Ltd. 30(b)(6) Witness Nobuhiko Kobayashi, Volume I (Hereinafter "Hitachi 30(b)(6) Deposition of Nobuhiko Kobayashi, 17 July 2012"), p. 38:6 - 9.

⁴⁴ Generally, the sizes discussed are the size of the CRT itself. However, manufacturers also referenced tubes by their viewable area, e.g. 25-V or 25V. Philips 30(b)(6) Deposition of Roger De Moor, 31 July 2012, pp. 46:11-47:9.

⁴⁵ CDTs smaller than 14" are not observed in worldwide data from 1996-2006. CDTs larger than 21" are not observed in worldwide data from 1996-2000, and observations from 2005 - 2006 exhibit 21"+ CDTs comprising small shares of overall CDT production. See, e.g.,

- Samsung, 11 December 2003, Worldwide CDT Manufacturer's Status, SDCRT-0201291.
- DisplaySearch, 30 September 2005, Q3'05 Quarterly Desktop Monitor Shipment and Forecast Report, CHU00281352 - CHU00281923 at 1644.
- DisplaySearch, 30 March 2007, Q1'07 Quarterly Desktop Monitor Shipment and Forecast Report, CHU00154037 - CHU00154420 at 4389.

⁴⁶ CPTs smaller than 14" and larger than 34" comprise a small portion of worldwide CPT production from 2000 - 2006. MT Picture Display, November 2006, Untitled Spreadsheet, MTPD-0416090.

⁴⁷ Michael Milostan, Senior Manager of Toshiba America's technical staff in 2000, talking about wide screens before the International Trade Commission: "... the SDTV format is designed for the four by three aspect ratio. By comparison, wide-screen CPTs with the 16 by nine aspect ratio which are optimal types of CPT for HDTV broadcasts... And whether the standard becomes SDTV or HDTV is anything but certain. It would be a long time before the market sorts out the choices. In the meantime, conventional CPTs with four by three aspect ratios will remain the workhorse of the industry." United States International Trade Commission, 17 February 2000, United States International Trade Commission In the Matter of: Color Picture Tubes from Canada, Japan, Korea, and Singapore, SDCRT-0068880 - SDCRT-0069081 at 9015.

⁴⁸ The scanning frequency of a CRT describes the frequency at which the screen is repainted. "...at the consumer electronics show that was held in Las Vegas just last month every and each Japanese Korean company [sic] heavily

The flatness of the panel, which I refer to as the “shape”, is another dimension of differentiation. The front panel of a CRT was traditionally a portion of a sphere. Over time, manufacturers increased the radius of curvature of the screens in order to make the screens flatter.⁴⁹ Eventually manufacturers were able to produce truly flat CRTs. These went by various names, including – pure flat, real flat, Dynaflat.⁵⁰

Another type of differentiation across CRTs is the degree to which the CRT assembly is completed by the tube manufacturer, in particular with regard to whether or not the product shipped with a deflection yoke. When a CRT is shipped without a deflection yoke, it is called a “bare” CRT. A CRT with a deflection yoke is called an “integrated tube component” (ITC) CRT.⁵¹

I am aware of other variations among CRTs that the cartel members at times addressed in their discussions of tube pricing. For example, the shadow mask can be made of different materials, with Invar and aluminum killed steel (AK) being the two most frequently discussed.⁵² For CDTs, resolution, indicated by the “dot pitch” (distance between dots of the same color), was another type of differentiation.⁵³ Lastly, there are also different safety and performance standards for monitors that can affect the price.⁵⁴

3. Design-in competition

promoted and demonstrated 16-by-9 CRTs as the immediate answer for high-definition, digital TV in the market today.” United States International Trade Commission, 17 February 2000, United States International Trade Commission In the Matter of: Color Picture Tubes from Canada, Japan, Korea, and Singapore, SDCRT-0068880 - SDCRT-0069081 at 8906.

⁴⁹ These tubes went by various names. Some specified the “flatness” in terms of a multiplier of ‘R’ – 1.0R, 1.3R, 1.5R, 1.7R, 2.0R – all referencing an increasing radius of curvature, and hence flatter, but still curved, screen. SDI, Undated, Model of SDI CRT Product, SDCRT-0021278 - SDCRT-0021294 at 1278. These were also described as “flat square” or “square flat” tubes because the tube corners were closer to square and the panel was closer to flat than older styles. 2000, The Different Types of CRT Monitors: From ShortNeck to FST [ca. 2000], PC Tech Guide, <http://www.pctechguide.com/crt-monitors/the-different-types-of-crt-monitors-from-shortneck-to-fst>, accessed 13 March 2012 at 2. MTPD ascribed “FS” (flat square) to 1.3R and 1.7R tubes. MT Picture Display, 20 January 2005, MTPDT FY2005-06 Business Plan, MTPD-0401227 at tab ‘Product Lineup’, Rows 45 & 47.

⁵⁰ See, e.g.,

- Pure flat is truly flat. Panasonic, Undated, Panasonic Display Development Plan, MTPD-0570911 at 1.
- Dynaflat has a flat screen surface and a curved inner surface. Flatron has a perfectly flat screen surface and inner surface. Also, real flat indicates that the screen has flat screen surface. LG, Undated, Why Flatron?, LGE00060914 at 4-5.

⁵¹ Hitachi 30(b)(6) Deposition of Thomas Heiser, 03 July 2012, p. 44:4-20.

⁵² Invar is high-nickel-content steel. AK steel is manufactured using aluminum powder in the foundry process to remove impurities from the steel. Invar resists deformation from heat (which is generated by electrons striking the mask) better than AK steel. SDI, Undated, Model of SDI CRT Product, SDCRT-0021278 - SDCRT-0021294 at 1279.

⁵³ 2012, What is the Dot Pitch of a Computer Monitor, PC Tech Guide, <http://www.pctechguide.com/crt-monitors/what-is-the-dot-pitch-of-a-computer-monitor>, accessed 13 March 2012.

⁵⁴ TCO and MPRII, frequently referenced in meeting note discussions about CDT prices, are safety standards promulgated by Sweden. PCTechGuide.Com, Undated, TCO Monitor Standards, <http://www.pctechguide.com/crt-monitors/tco-monitor-standards>, accessed 03 August 2012, p. 0115.

In addition to the types of product differentiation just described, there are other differentiating factors among CRTs. While the factors just described generally allowed end product differentiation, there are other attributes – e.g., subtle differences in the curvature of the tube where it meets the bezel of the TV or different electrical requirements – that are crucial to end product manufacturers.

Due to this type of product differentiation, competition among CRT vendors is for design-in, not each individual CRT order. When a TV or monitor manufacturer plans to develop a new model, the CRT vendors compete to win the design.⁵⁵ Once a TV or monitor manufacturer has chosen a specific CRT as the basis for a given model of TV or monitor, it cannot readily substitute a different vendor's CRT into the finished product.⁵⁶ The TV or monitor manufacturer would

⁵⁵ “Q. Okay. And how would the customer articulate its needs to HED/US? A. There was a whole design process that went on before a picture tube was ever sold. You'd have probably a six months to one year, depending upon the customer, that would be a design cycle where we knew they were coming out with a new television set, and our engineer, our sales engineer would begin to work with them on the specification, what they wanted, what kind of performance, what kind of pinning specification, for example, how fine did they want it Pinned, what would they allow for convergence, or for -- there were various other specifications you'd use on how the yoke was going to perform. Trapezoidal. There was many different parts of it, and those would all be called out in that design specification.” Hitachi 30(b)(6) Deposition of Thomas Heiser, 03 July 2012, p. 69:2-17.

⁵⁶ This is because of significant differences across CRTs that, unlike the size, shape, and other differences described earlier in the text, are not manifested in the appearance of the tube. For example, different tubes use different electron guns and deflection yokes, giving tubes from different vendors unique electrical requirements; the shape of the outer edges of the screen are different across different tubes, requiring different faceplate or bezel shapes to mate with them.

- Tatsuo Tobinaga testified that CPTs are not interchangeable because of electrical requirements and the deflection yoke: “Q. If a customer ordered a 15-inch tube from Samsung and a 15-inch tube from Panasonic, would that customer be able to use those tubes interchangeably in a given TV model without altering it? A. My understanding is that it's not possible to interchange them without making any changes whatsoever. Q. What changes would need to be made? A. First of all, there is two – an electronic beam – there is a cathode in the back, and the cathode has a filament. And the filament differs depending on the manufacturer. And so the power circuit would have to be changed. And then for the deflection yoke, there's a thing called impedance, and resistance and the capacity would be different by company. So that would have to be adjusted. And so my understanding is that for a set the resistance in the condenser would have to be changed.” Panasonic 30(b)(6) Deposition of Tatsuo Tobinaga, 16 July 2012, p. 142:1-18.
- Jain Lee testified that different CRTs were shaped differently where they meet the faceplate of the end product, making it difficult to switch to an alternative tube for an existing product design. “THE WITNESS: Well, that's what – that's what our company considered, but, in fact, the – the components that go into the product are all very different, so between our company's product and the competitors' products, it's not like we could do pin-to-pin or use interchangeably right away. That was not the situation. If I explain it a little further, when you designed a product, there is a part where the cabinet and the glass are supposed to be matching. There's – at that location there's a curvature that we're talking about. And it's not like where our company's product would fit in the competitor's product could be interchangeably placed in – placed in instead.” 06 June 2012, Deposition of Samsung SDI 30(b)(6) Witness Jaein Lee, Volume I (Hereinafter “Samsung SDI 30(b)(6) Deposition of Jaein Lee, Vol. I, 06 June 2012”, p. 119:6-20.
- Toru Iwasawa testified that CRTs are not interchangeable for a specific television because of the television's components: “Q...if Hitachi was making a television using one manufacturer's CPT, could Hitachi switch to using a different manufacturer's CPT without changing other components of the televisions? A. I don't think so. Q. Why not? A. A completed television set has a CRT that fits in that television set. That is the design of that CRT on the television that are matched to each other. If you bring CRT for another product – another TV and replace just the CRT, I don't think it is possible. That's because all those components are manufactured according to the specifications.” 11 July 2012, Deposition of

instead produce an alternative monitor or TV model using a different vendor's tube.⁵⁷ However, the process of developing a television design and qualifying a tube often takes six months to a year.⁵⁸

A CRT manufacturer might compete for a design win with an existing tube design, a variation of an existing design, or a completely new design. The result is that tubes of a given size, aspect ratio, and shape from a given manufacturer might vary somewhat across customers.⁵⁹ This leads to a situation where CRT manufacturers cannot produce for inventory and sell "off-the-shelf" tubes as customers request them.⁶⁰ Instead, tubes are manufactured to customer order or customer forecast.⁶¹

Hitachi Displays, Ltd. 30(b)(6) Witness Toru Iwasawa (Hereinafter "Hitachi 30(b)(6) Deposition of Toru Iwasawa, 11 July 2012"), pp. 29:10-30:1.

- Yasuhiro Morishima testified finished product manufacturers choose one CRT manufacturer to produce the CDTs for a monitor model because they incur costs when notifying their organizations of the decisions and preparing their service departments. 12 July 2012, Deposition of Hitachi Displays, Ltd. 30(b)(6) Witness Yasuhiro Morishima, Volume I (Hereinafter "Hitachi 30(b)(6) Deposition of Tasuhiro Morishima, 12 July 2012"), p. 67:1-16.

⁵⁷ "Generally what would have to happen is customers would either have to do custom design around our specific tube type because our mechanics were different. So, or if they decided to try to so-called dual source, they needed to have two separate types of chassis due to the mechanical, some of the electrical differences of our product." 31 July 2012, Deposition of Toshiba America Electronics Corporation 30(b)(6) Witness Jay Alan Heinecke (Hereinafter "TAEC 30(b)(6) Deposition of Jay Alan Heinecke, 31 July 2012"), pp. 38:8-39:2.

⁵⁸ For example:

- From the initial stage of receiving a finished product manufacturer's request for a quote until mass production starts is often six months to a year. Hitachi 30(b)(6) Deposition of Thomas Heiser, 03 July 2012, p. 69:2 - 17.
- Samples of the A68LRE30X(D) tube were provided to Panasonic October 1998 - January 1999, a pilot run of 110 pieces occurred in February 1999, and mass production of 11,000 units begins in March 1999. Hitachi Electronic Devices (USA), 05 March 1999, HEDUS-CRT00152072, HEDUS-CRT00152072 at 1.

⁵⁹ TAEC 30(b)(6) Deposition of Jay Alan Heinecke, 31 July 2012, pp. 82:10-83:15

⁶⁰ See, e.g.,

- "Q. And did you ever make, for lack of a better word, off-the-shelf sales? A. No." Hitachi 30(b)(6) Deposition of Thomas Heiser, 03 July 2012, p. 51:8-10.
- "Q. Were there any types of CRT inventory that were sold sort of off the shelf? A. Not A grade. Would be B grades. Q. Would those be sold to manufacturers of televisions and computer monitors? [Objection omitted] A. No. What I remember is that B grades were sold to special firms producing video games. Q. So we can say most if not all of the tubes that went into televisions or monitors from the Ottawa plant were made to order? A. Yes." 31 July 2012, Deposition of Philips Electronics North America Corporation, Inc. and Koninklijke Philips Electronics N.V. 30(b)(6) Witness Roger De Moor (Hereinafter "Philips 30(b)(6) Deposition of Roger De Moor, 31 July 2012"), p. 135:5-17.

⁶¹ See, e.g.,

- Hitachi only manufactured CRTs when they had a forecast from a customer indicating the tubes would be needed. Hitachi 30(b)(6) Deposition of Nobuhiko Kobayashi, 17 July 2012, pp. 79:5-80:6.
- "A. Basically with CRTs are made to order components. ... Basically CRTs are not readymade. They are made to order." Panasonic 30(b)(6) Deposition of Tatsuo Tobinaga, 16 July 2012, pp. 73:19-75:1.

B. CRT manufacturing

CRT production occurs as a sequential process on a production line. Most CRT production lines are dedicated to producing a limited range of CRT products. Production lines can generally be modified to produce new products, with the difficulty of the modifications depending on how closely related the new product is to the existing capabilities of the line.

CRTs are produced in large factories. While most factories tend to have multiple production lines, there were several that had just one. CRT factories are typically capable of producing between 100,000 and 1 million CRTs per month, with the largest factories able to produce over 1.5 million CRTs per month. See Exhibit 3.

1. General production process

CRT manufacturers typically acquire the major components – funnel, panel, electron gun, and mask – from other facilities.⁶² Most of the major components have additional processing done to them at the CRT plant, then are assembled into a CRT. The manufacturing process prepares the mask and, separately, applies the phosphors and other coatings to the panel. The mask and panel are then mated. The funnel has also been coated, then the funnel and panel are joined in a process called “frit sealing”. This assembly is now called a “bulb”. The electron gun is inserted into the neck of the funnel and the funnel is sealed around the gun. The tube is annealed (heated) to remove residual stress and a vacuum is drawn inside the tube. Lastly, an external band is wrapped around the front of the tube where the panel and funnel are joined. This band has “lags” on it which are used to attach the tube to the TV or monitor chassis or frame.⁶³ At this point the product is a CRT, or a bare CRT.

Before the CRT can create pictures, the deflection yoke and related components must be installed and properly adjusted. Deflection yoke installation is the last step of the CRT

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- “Q. Okay. And were all of the monitors that you manufactured, manufactured pursuant to a particular purchase order? A. Yes, correct.” Hitachi 30(b)(6) Deposition of Tasuhiro Morishima, 12 July 2012, p. 88:6-9.

⁶² For example:

- A Chunghwa analysis of Japanese CRT manufacturers reports the main component suppliers for each CRT manufacturer. Chunghwa Picture Tubes, LTD, 1995, CRT Market Reporting Japanese Suppliers, CHU00028178 - CHU00028190 at 8179, 8182, 8184, and 8186.
- Some CRT manufacturers had “sister” companies that manufactured some of these components. See Chunghwa Picture Tubes, LTD, 14 March 2003, Chunghwa Picture Tubes, Ltd. and Subsidiaries Consolidated Financial Statements For The Years Ended December 31, 2002 and 2001 with Report of Independent Auditors, CHU00000207 - CHU00000259 at 0214 and 28 August 2006, Trustee's Second Report in the bankruptcies of LG.Philips Displays Holding B.V. and LG.Philips Displays Netherlands B.V. and LG.Philips Displays Investment B.V., <http://deterinklive.com/nl/publicaties/faillissementsverslagen/1/>, accessed 12 July 2012 at 25.
- Samsung made its own deflection yokes for high-end products, but purchased others. They made their own electron guns. They purchased glass and masks. Samsung SDI 30(b)(6) Deposition of Jaemin Lee, Vol. I, 06 June 2012, pp. 101:21-102:20.

⁶³ See SDI, Undated, Model of SDI CRT Product, SDCRT-0021278 - SDCRT-0021294 at 1290 – 1294 and Engelsens, Daniel den, 15 June 2000, Manufacturing of CRTs 1, SDCRT-0202981.

manufacturing process.⁶⁴ In this step, referred to variously as the ITC (“integrated tube component”) process,⁶⁵ “pinning”,⁶⁶ or “matching”,⁶⁷ the deflection yoke and focusing magnet are installed and adjusted to generate the best picture.⁶⁸ Depending on customer (finished product manufacturer) preferences, the yoke can be installed by the CRT manufacturer, the customer, or by third parties.⁶⁹ If the customer or a third party is performing the ITC process, the CRT can be sold without a deflection yoke, with the deflection yoke packed separately from the tube, or with the deflection yoke on the tube but not pinned.⁷⁰ Once the deflection yoke is installed and pinned, the product is an ITC or ITC CRT.

2. Production line flexibility

Although there is almost no demand substitution across the two tube types, CRT production facilities have some capability for supply substitution by converting CRT production lines from producing tubes for one application to producing tubes of the other type. A few lines were capable of producing either type, with the switch from one type to the other needing relatively

⁶⁴ 13 July 2012, Deposition of LG Electronics 30(b)(6) Witness Kyung Tae Kwon (Hereinafter “LGE 30(b)(6) Deposition of Kyung Tae Kwon, 13 July 2012”), pp. 106:7-107:1.

⁶⁵ Hitachi 30(b)(6) Deposition of Nobuhiko Kobayashi, 17 July 2012, pp. 22:11-23:6.

⁶⁶ Hitachi 30(b)(6) Deposition of Thomas Heiser, 03 July 2012, p. 71:1-23.

⁶⁷ Philips 30(b)(6) Deposition of Roger De Moor, 31 July 2012, pp. 18:5-19:15.

⁶⁸ The deflection yoke uses magnetism to aim the electron beam. The electron beam, comprised of charged particles, is affected by not only the deflection yoke’s magnetic field, but also by the Earth’s magnetic field and the magnetic fields generated by various electrical components inside the television or monitor. During the ITC process, the deflection yoke is adjusted to compensate for the various magnetic fields affecting the beam and fastened rigidly to the neck of the funnel. See Hitachi 30(b)(6) Deposition of Nobuhiko Kobayashi, 17 July 2012, pp. 22:11-23:6 and LGE 30(b)(6) Deposition of Kyung Tae Kwon, 13 July 2012, pp. 106:7-107:1.

⁶⁹ See, e.g.,

- Hitachi sold both bare and ITC CRT. When Hitachi’s “Set Division” [a finished product manufacturer] bought bare tubes, it performed the ITC process. Hitachi 30(b)(6) Deposition of Nobuhiko Kobayashi, Vol. I, 17 July 2012, pp. 45:18-46:21.
- When Samsung sold bare CRTs, the deflection yoke would be installed by the customer. Samsung SDI 30(b)(6) Deposition of Jaein Lee, Vol. I, 06 June 2012, pp. 102:9-103:9.
- Hitachi outsourced the ITC process on occasion, over a period of several years. Samsung SDI 30(b)(6) Deposition of Jaein Lee, Vol. I, 06 June 2012, pp. 88:7-89:2.
- Philips’s Ottawa plant sold some tube bare, some ITC, and some were shipped to a plant in Juarez, Mexico which performed the ITC process for Philips Consumer Electronics plant in Juarez. 31 July 2012, Philips 30(b)(6) Deposition of Roger De Moor, 31 July 2012, pp. 18:5-9:15.
- LGE 30(b)(6) Deposition of Kyung Tae Kwon, 13 July 2012, pp. 106:7-107:1.

⁷⁰ For example, Samsung distinguished among Bare (no deflection yoke or CPM), ITC (all components installed and adjusted to match finished product), “CKD” (complete knock down; ITC parts supplied but packed separately from CRT), and “SKD” (semi knock down; ITC parts installed but not adjusted). SDI, Undated, SDI CRT Model Number Decoder, SDCRT-0021274 - SDCRT-0021277 at 1277.

little time.⁷¹ However, switching production lines between applications was relatively rare.⁷² Most CRT production lines produced exclusively CDTs or CPTs.⁷³

CRT production lines can relatively easily change the size of tubes they are producing. Almost all CRT production lines produced various size tubes over time and most were able to produce different sizes at any given time.⁷⁴ Some lines were capable of producing multiple sizes intermixed, rather than running one size for a while then switching to another size.⁷⁵

There were some costs just to switch between two different tube specifications of a given size. For example, different customers might use different electron guns in the same basic tube, causing changes in how the guns were inserted. Adjusting lines for such changes might take two shifts.⁷⁶

3. Production facilities

CRT manufacturing is a capital-intensive process characterized by economies of scale. Viable CPT factories should produce at least 1.0 million tubes per year.⁷⁷ A CRT manufacturing facility

⁷¹ For example, the #1 line at Samsung's Suwon plant could switch from making CDT to CPT or vice versa in about one shift, even though it required changing a lot of the production line. 06 June 2012, Deposition of Samsung SDI 30(b)(6) Witness Jaemin Lee, Volume I, pp. 113:8-114:3.

The line status reports suggest only 11 lines, out of 265 lines that exhibited positive capacity covered by the reports, regularly or repeatedly produced both tube types. Lines that exhibited positive CPT and CDT capacity simultaneously on at least two distinct dates in each of at least two distinct years are considered to have sufficient observations to be considered a "hybrid" line. E.g., a line with positive CPT and CDT capacity on two different dates within 2003 and two different dates in 2004 would be considered a hybrid line, whereas a line with only one hybrid observation in each year would not. "Hybrid-switch" lines are lines that satisfy our criteria for a "hybrid" line, but also contain observations in which they produce both CPTs exclusively and CDTs exclusively. Samsung's Suwon #1 line is among the 11 lines I classify as "hybrid" or "hybrid-switch". See Exhibit 4

⁷² "Q. ... What I was trying to ask you was that with respect to those lines that could produce CDT products, those same lines could also produce CPT products if the company went to the time and expense of switching lines, correct? [Objection omitted] THE WITNESS: It would have been possible, but we did not feel the need to do that." Samsung 30 SDI (b)(6) Deposition 06 June 2012, p. 122:8-17.

⁷³ Only 37 of the 265 lines that are shown to have positive capacity during the period covered by the line status reports (September 2001 through August 2009) produced more than one type (CDT or CRT) of tube. See Exhibit 4.

⁷⁴ Exhibit 3.

⁷⁵ "You could actually have a line going where your one device you're hanging in the rack may be a 19 and the next one could be a 20..." TAEC 30(b)(6) Deposition of Jay Alan Heinecke, 31 July 2012, p. 84:10-12.

⁷⁶ TAEC 30(b)(6) Deposition of Jay Alan Heinecke, 31 July 2012, pp. 82:10-83:15.

⁷⁷ See, e.g.,

- Sony and LG each built plants planned to produce 1 million units per year. Telecompaper, 20 July 1994, Sony Electronics to Invest in Cathode Ray Tube Plant, <http://www.telecompaper.com/news/sony-electronics-to-invest-in-cathode-ray-tube-plant>, accessed 22 March 2012 at 1. and Telecompaper, 06 September 1995, LG Electronics to Invest in CRT Plant, <http://www.telecompaper.com/news/lg-electronics-to-invest-in-crt-plant>, accessed 22 March 2012.
- One author asserts the minimum efficient scale for a CRT plant was 1.5 million units per year. Kenney, Martin, Undated, The Shifting Value Chain: The Television Industry in North America, http://hcd.ucdavis.edu/faculty/webpages/kenney/articles_files/The%20Shifting%20Value%20Chain:%20The%20Television%20Industry%20in%20North%20America.pdf, accessed 19 April 2012, p. 105. This document appears to have been written no later than 8/1/03.

will cost from under \$100 million to over \$300 million to build.⁷⁸ CRT manufacturing facilities that make larger tubes generally cost more.⁷⁹ Adding capacity to an existing plant is also

Note that 1.5 million CRT per year is 125,000 tubes per month. Many individual lines had capacity in excess of 125,000 tubes per month. Individual production lines range in capacity from 20,000 to over 300,000 tubes per month. See Exhibit 3.

⁷⁸ See,

- A new CRT facility will cost approximately 10 billion yen or 120-130 million US dollars. Panasonic 30(b)(6) Deposition of Tatsuo Tobinaga, 16 July 2012, pp. 146:8-147:8, 151:15-152:11.
- An LG plant in Korea, for the production of 24"-32" CPTs beginning in 1996, cost \$125 million and was expected to produce 1 million CPTs per year. Telecompaper, 06 September 1995, LG Electronics to Invest in CRT Plant, <http://www.telecompaper.com/news/lg-electronics-to-invest-in-crt-plant>, accessed 22 March 2012.
- A Sony plant for 15" and 17" CDT with a capacity of 1 million units per year cost \$50 million. Telecompaper, 20 July 1994, Sony Electronics to Invest in Cathode Ray Tube Plant, <http://www.telecompaper.com/news/sony-electronics-to-invest-in-cathode-ray-tube-plant>, accessed 22 March 2012 at 1.
- In the late 1980s a large screen (25" or more) CRT manufacturing facility generally cost between \$200 and \$300 million. Kenney, Martin, Undated, The Shifting Value Chain: The Television Industry in North America, http://hcd.ucdavis.edu/faculty/webpages/kenney/articles_files/The%20Shifting%20Value%20Chain:%20The%20Television%20Industry%20in%20North%20America.pdf, accessed 19 April 2012, p.105.
- Pat Magrath of Georgetown Economic Services stated before the International Trade Commission on February 17, 2000 that CPT factories cost between \$70 and \$332 million to build. United States International Trade Commission, 17 February 2000, United States International Trade Commission In the Matter of: Color Picture Tubes from Canada, Japan, Korea, and Singapore, SDCRT-0068880 - SDCRT-0069081 at 8922.

⁷⁹ Kenney, Martin, Undated, The Shifting Value Chain: The Television Industry in North America, http://hcd.ucdavis.edu/faculty/webpages/kenney/articles_files/The%20Shifting%20Value%20Chain:%20The%20Television%20Industry%20in%20North%20America.pdf, accessed 19 April 2012, pp. 104-105.

expensive.⁸⁰ In addition, CRT manufacturing requires substantial ongoing investments in capital.⁸¹

Building a plant or adding a line also takes a lot of time. Constructing the plant or line can take a year and another year is required to get the completed line up to mass production.⁸² For a line to reach full efficiency might take a further year or more of mass production.⁸³

On top of the time and capital required, there is substantial risk involved in establishing a new CRT facility or line. Despite CRT manufacturing being a mature technology, manufacturers sometimes were unable to develop economical production on a given line or of a given product.⁸⁴

⁸⁰ See, e.g.,

- LG Philips planned to spend \$112 million installing two large/jumbo CPT lines at the Gomez Palacio plant in Mexico. ABN AMRO Bank, N.V., Citibank/Salomon Smith Barney Hong Kong Limited, et al., May 2001, LG.Philips Displays Holding B.V. US\$2,000,000,000 Senior Term Loan and Revolving Credit Facility, PHLP-CRT-051982 - PHLP-CRT-052085 at 2046 and 2078.
- Adding a line could cost as much as \$160 million. United States International Trade Commission, 17 February 2000, United States International Trade Commission In the Matter of: Color Picture Tubes from Canada, Japan, Korea, and Singapore, SDCRT-0068880 - SDCRT-0069081 at 8922.
- LG's investment plans for installing additional lines to produce its "Flatron" real flat CRTs ranged from 97 billion Won to 151 billion Won (at an exchange rate of 1200 Won per dollar, these convert to \$80 million to \$125 million per line). Salomon Smith Barney Inc., 22 May 2001, Project Mercury Confidential Information Memorandum, EIN0017699 - EIN0018075 at 7842.
- Philips spent \$24 million on two small lines (80k/month capacity) producing 17" CDTs. Display Monitor, 22 May 2000, SGI Uses Quadro In New Workstations, Display Monitor, Vol. 7(20), HEDUS-CRT00166844 - HEDUS-CRT00166863 at 6844.

⁸¹ See, e.g.,

- LG's investment plans for updating existing lines to produce its "Flatron" real flat CRTs ranged from 22 billion to 68 billion Won (at an exchange of 1200 Won per dollar, these convert to \$18 million to \$56 million). Salomon Smith Barney Inc., 22 May 2001, Project Mercury Confidential Information Memorandum, EIN0017699 - EIN0018075 at 7842.
- Toshiba invested over \$150 million in its existing Horseheads, NY CRT plant in the five years up to March 2003. Panasonic, 27 March 2003, Matsushita and Toshiba To Launch North American Operations of New CRT Joint Venture, http://www.Panasonic.com/MECA/press_releases/toshiba_032703.pdf, accessed 10 July 2012, p. 1. That is in addition to \$220 million spent in the mid-1980s refurbishing and expanding the same facility. Kenney, Martin, Undated, The Shifting Value Chain: The Television Industry in North America, http://hcd.ucdavis.edu/faculty/webpages/kenney/articles_files/The%20Shifting%20Value%20Chain:%20The%20Television%20Industry%20in%20North%20America.pdf, accessed 19 April 2012, p. 105.

⁸² See, e.g.,

- Building a facility can take a year and another year is required to get the line up to mass production speeds. Panasonic 30(b)(6) Deposition of Tatsuo Tobinaga, 16 July 2012, pp. 146:8-147:8.
- It can take two years to complete a plant or add a line. Testimony of Pat Magrath, United States International Trade Commission, 17 February 2000, United States International Trade Commission In the Matter of: Color Picture Tubes from Canada, Japan, Korea, and Singapore, SDCRT-0068880 - SDCRT-0069081 at 8922.

⁸³ TAEC 30(b)(6) Deposition of Jay Alan Heinecke, 31 July 2012, p. 249:13-17.

⁸⁴ See, e.g.,

As an example, LG Philips established a plant in Nanjing, China, with an initial investment of \$100 million. The plant installed five production lines in two stages, three lines in the third quarter of 2000 and two more in the third quarter of 2001. However, the factory had problems attaining either adequate run rates or quality. By July 2002, LG Philips was expecting it might cost another \$15 million to \$25 million to revise the equipment, modify product designs and correct operating processes.⁸⁵

Another example is Samtel. In April 2004 they announced a \$22 million project to add 1.5 million units of CPT capacity at their Ghaziabad, India plant with a May, 2005 start date.⁸⁶ Line status reports from various defendants indicate the start date being delayed, with mass production finally commencing in after mid-March, 2006.⁸⁷ However, despite the planned capacity of 125 thousand units per month (= 1.5 million per year), by August of 2007 the line has a reported capacity of only 41.667 thousand units per month.⁸⁸

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- Toshiba's U.S. factory in Horseheads, NY, variously tried producing 27" CPTs, 17" CDTs and 19" tubes, and was unable to produce any of those products economically. Toshiba 30(b)(6) Deposition 31 July 2012, pp. 59:17-61:16.
 - IRICO had problems with the varnish it used to hold its deflection yokes in place; the varnish was melting. This resulted in many CRT returns and IRICO was having difficulties gaining sales thereafter. Chunghwa Picture Tubes, LTD, 23 June 2000, Visitation Report, Topic: TV Tube Market, CHU00029110 - CHU00029115 at 9114E
 - "The production lines at Huapu [a Philips plant in Nanjing, China] have not reached their nominal annual capacity of 4 m. tubes and are producing low quality tubes. As a result, Huapu's sales are far behind budget, while Huapu has too much B-grade products, too much inventory and is facing high product returns. Huapu's net income for 2002 is expected to end up at - 18.4 m. USD, washing out Huapu's entire equity. [para.] To tackle these issues, an extensive improvement plan is under preparation together with the new Plant Director, thereby addressing the inadequate equipment, product designs, operating processes and organizational competence. An investment in the range of 15 - 25 m. USD might be needed." L.G. Philips Displays Holding B.V., Undated, Minutes of the Supervisory Board Meeting of LG.Philips Displays Holding B.V., PHLP-CRT-002306 - PHLP-CRT-002481 at 2339.

⁸⁵ L.G. Philips Displays Holding B.V., Undated, Minutes of the Supervisory Board Meeting of LG.Philips Displays Holding B.V., PHLP-CRT-002306 - PHLP-CRT-002481 at 2339.

⁸⁶ LG Philips Displays, 27 July 2004, 40422+W_W_line--factory line summaries, LPD_00035873.

⁸⁷ See, e.g.,

- "Plan to start in '05" appears from Dec. 2004 to April 2005. LG Philips Displays, 20 December 2004, 04 12 CRT Line Status, LPD_00034786 and LG Philips Displays, 21 April 2005, 04-21-05 World wild prod lines - All LG Philips Displays, 21 April 2005, 04-21-05 World wild prod lines - All manufacturers, LPD_00042476.
- In June 2005, "Production start is delayed to 1Q2006." MT Picture Display, 04 July 2005, CRT Line Status Jun 05, MTPD-0575968.
- On March 15, 2006, "MP is not started yet". MT Picture Display, 02 April 2006, CRT Line Status Mar 06, MTPD-0468631.
- June 2006, "29F started in 1Q 06". MT Picture Display, 19 June 2006, CRT Line Status Jun 06, MTPD-0426099.

⁸⁸ LG Electronics, 09 August 2007, CRT Line Status, LGE00089431. In August 2009, the last of the line status reports I have found listing this line, the capacity is up to 83,000 units per month. LG Electronics, 10 August 2009, Global C-CRT Line Status, LGE00091898.

As indicated by the technical problems faced by various manufacturers, technical knowledge about CRT manufacturing was not always available. If such knowledge were readily available, manufacturers would not have abandoned attempts to introduce new products.⁸⁹ As an example, when Irico was having technical problems, it first sought assistance from Toshiba, an investor in Irico at the time. When “Toshiba was not too enthusiastic in transferring technology”, Irico sought help from Chunghwa.⁹⁰

It is unclear how readily CRT plants can be used for purposes other than manufacturing CRTs. There is some testimony the plants have little other use.⁹¹ However, it appears Chunghwa converted a CRT plant to produce plasma display panels after moving the CRT lines to a Chunghwa plant in China.⁹²

CRT manufacturing equipment is not useful for anything other than manufacturing CRTs.⁹³ Some manufacturers tried to sell disused lines, without success.⁹⁴

C. CRT industry structure

1. Concentration

As noted above, customers generally cannot substitute between CDT and CPT. Production shares calculated for CDT and CPT show the cartel members had a very large share of production of each type of tube. See Exhibits 5 and 6, respectively. The Herfindahl-Hirschman Index (HHI) is

⁸⁹ Here I refer specifically to products abandoned expressly due to technical inability to produce the product, as described earlier.

⁹⁰ Chunghwa Picture Tubes, LTD, 23 June 2000, Visitation Report, Topic: TV Tube Market, CHU00029110 - CHU00029115 at 9114E.

⁹¹ See, e.g.,

- “Q. Do you know whether CRT production facilities can be used for manufacturing anything other than CRTs? A. Based on my understanding, that's not possible.” Hitachi 30(b)(6) Deposition of Nobuhiko Kobayashi, 17 July 2012, p. 93:7-11.
- MTPD's Ohio plant is now producing garage “shutters” [doors?]; their Indonesian plant was demolished after they shut it down. Panasonic 30(b)(6) Deposition of Tatsuo Tobinaga, 16 July 2012, pp. 147:9-149:8.

⁹² “Since late 2000, in order to take advantage of lower labor costs in the China, the Company began moving two 15 inch CDT production lines and two 17 inch CDT production lines from Taoyuan, Taiwan to Chunghwa Picture Tubes (Fuzhou) Ltd., and replacing those production lines with PDP (plasma display Panel.)” Chunghwa Picture Tubes, LTD, 15 August 2002, Chunghwa Picture Tubes, Ltd. Financial Statements For The Three-Month Period Ended March 31, 2002 And 2001 With Report of Independent Auditors, CHU00000260 - CHU00000304 at 0278.

⁹³ See, e.g.,

- Hitachi 30(b)(6) Deposition of Nobuhiko Kobayashi, 17 July 2012, p. 93:21-25.
- Prior to 2004, MTPD sometimes overhauled lines that were being shut down at one plant and installed them at a different plant. They decided “it wasn't possible to really create a very good facility doing it that way.” Their attempts to sell disused lines were unsuccessful. After 2004 or 2005, they decided to scrap the CRT lines when they shut them down. Panasonic 30(b)(6) Deposition of Tatsuo Tobinaga, 16 July 2012, p. 149:6-8.

⁹⁴ See, e.g.,

- “...did you ever sell any equipment to third parties? A. We tried that, but it wasn't successful.” Panasonic 30(b)(6) Deposition of Tatsuo Tobinaga, 16 July 2012, pp. 147:9-149:8.

widely used in academia as well as in antitrust legal and economic analysis to measure the degree of concentration.⁹⁵ The HHI is based on the distribution of market shares across firms. Lower HHI values indicate a less concentrated market and, hence, more competitive conditions for market participants. According to the 2010 Horizontal Merger Guidelines, the U.S. Department of Justice (DOJ) considers markets with HHIs below 1500 to be “unconcentrated”, between 1500-2500 “moderately concentrated”, and above 2500 “highly concentrated.”⁹⁶ Production of each type of tube is highly concentrated with the cartel in place, with HHIs in excess of 8,000 for CDT production and 7,000 for CPT production. This is a dramatic contrast to the degree of concentration that would have existed absent the cartel. See Exhibits 7 and 8.

However, as also noted above, supply substitution is possible: some lines were designed to be able to switch relatively quickly between CDT and CPT production, other lines were converted from producing one product to the other. Therefore I also examine CRT manufacturing as a whole. With the cartel in place, CRT manufacturing is highly concentrated, with the HHI exceeding 7800. Again, the concentration resulting from the cartel is in dramatic contrast to the concentration that would have existed absent the cartel. See Exhibit 9.

2. Excess capacity

Throughout the relevant period, CRT manufacturing capacity exceeded quantity demanded at the (cartelized) market prices. I first examine CDT manufacturing capacity and demand for CDT monitors over time. Then I turn to CPT production capacity and output.

a) CDT

Toshiba described CDT manufacturing as having “much excess” capacity and the ability to “easily increase” production in the late 1990s.⁹⁷ By Toshiba’s calculations, capacity equaled output in 1995, and thereafter exceeded output: by 19% in 1996, 31% in 1997, 37% in 1998, 35% in 1999 and 27% in 2000.⁹⁸

In 2000-2001, the dot-com crash depressed computer sales.⁹⁹ Unit sales of all types of computer monitors declined 3% from 2000 to 2001.¹⁰⁰ To make matters worse for CDT manufacturers,

⁹⁵ The Herfindahl-Hirschman Index (HHI) is calculated by summing the squares of the market shares of all participants in the relevant market. In the case of a pure monopoly, the Herfindahl takes the value of 10,000 (100 squared). In the case of perfect competition (in which no single firm has a large market share), the index will tend toward zero. The U.S. Department of Justice uses Herfindahl indexes as one of the tools to assess competitive conditions when deciding whether to challenge a proposed merger. U.S. Department of Justice and Federal Trade Commission, 19 August 2010, 2010 Horizontal Merger Guidelines.

⁹⁶ Department of Justice and Federal Trade Commission, 18 August 2010, 2010 Horizontal Merger Guidelines at Section 5.3 Market Concentration.

⁹⁷ “But CDT capacity is much excess (135% in 99) vs CDT demand ==>> CDT supply can be easily increased, if necessary.” Toshiba America Electronic Components, Inc., 21 July 1999, CDT & Monitor Demand Supply Analysis, TAEC-CRT-00065484 at Tab ‘topics’, K6:K7.

⁹⁸ See Toshiba America Electronic Components, Inc., 21 July 1999, CDT & Monitor Demand Supply Analysis, TAEC-CRT-00065484, Tab ‘MNTR VS CDT (2)’, row 92 and Toshiba Electronics Taiwan, 24 April 2001, CDT & Monitor Demand Supply Analysis, TET-CRT-00003403, at Tab ‘Deman&Supply graph’, row 37.

⁹⁹ PC shipment data show unit sales in the 2nd quarter 2001 had fallen below prior year sales. The data, citing IDC, also indicate full-year 2001 PC shipments will be about 6% lower than 2000. Toshiba America Electronics Components, 2001, PC Shipments by Quarter, 1994-2002, TAEC-CRT-00018123.

consumer demand was shifting away from CRT monitors to LCD monitors: LCD monitors rose from 5% of units in 2000 to 15% in 2001. The shift to LCD was occurring despite LCD monitor prices being four to five times the amount of CRT monitors of the same size.¹⁰¹

This double blow had a very significant impact on CDT manufacturing, with most vendors reporting very low utilization rates in 2001.¹⁰² Matsushita and TECO halted production and Orion was “struggling for survival.”¹⁰³

CDT production never recovered. When monitor demand returned to growth, LCD panels, not CDTs, benefited from the recovery. LCD monitors went from 15% of the market in 2001 to 28% in 2002 and captured ½ the market by 2004, again despite pricing that, by 2004, had LCD monitors at 2.5 times the price of CRT monitors of the same size.¹⁰⁴

b) CPT

Total output of CPTs rose from the start of the relevant period until it peaked in 2004. However, from 2000 onward, the increase in CPT output was less than the decline in CDT output, with total output of CRTs never regaining the 2000 peak. See Exhibit 10.

In 2000, CPT manufacturers’ available capacity, “without overtime”, was 16% greater than their production and the gap was expected to increase to 19% for the full year 2001.¹⁰⁵ As noted above, CDT manufacturers had 27% excess capacity in 2000.

3. Vertical integration¹⁰⁶

Many CRT manufacturers were vertically integrated into downstream production, manufacturing finished goods incorporating CRTs as well as CRTs. For example, cartel members Hitachi, LGE, Panasonic/Matsushita, Philips, Samsung, Thomson, and Toshiba are familiar names for their computer monitors and televisions. Outside the cartel, Sony is another familiar name, vertically integrated into finished product manufacturing. When the two big CRT joint ventures, LG Philips and MTPD, were formed, neither entity included the parent firms’ finished product arms. Many CRT manufacturers were also vertically integrated into upstream production, manufacturing components used for their own and other manufacturers’ CRTs.

D. Distribution of CRT monitors and TVs

CRTs travel from Defendants to class members through a distribution chain which generally includes the following levels:

¹⁰⁰ DisplaySearch, May 2011, Analysis Group, Inc. Custom Data Project, DISP_LCD_000128.

¹⁰¹ DisplaySearch, May 2011, Analysis Group, Inc. Custom Data Project, DISP_LCD_000128.

¹⁰² SDI had “the best loading in the industry (~75%)”, CPT was at 60%, Philips at 60%-65%, LG at 55%-60%, HTC <40%, Toshiba 60%, Sony 50%, Mitsubishi 58%. Baran, Milan, 08 May 2001, E-mail, Subject: CDT Price Guideline for May 2001, PHLP-CRT-026590 at 6591-6592.

¹⁰³ Baran, Milan, 08 May 2001, E-mail, Subject: CDT Price Guideline for May 2001, PHLP-CRT-026590 at 6591 - 6592.

¹⁰⁴ DisplaySearch, May 2011, Analysis Group, Inc. Custom Data Project, DISP_LCD_000128.

¹⁰⁵ Chunghwa Picture Tubes, LTD, October 2001, LINE Status by Maker, CHU00125296.

¹⁰⁶ See Appendix A for evidence underlying this section.

- CRT manufacturers sell CRTs to product manufacturers (sometimes via a distributor).
- CRT product manufacturers sell CRT products to retailers (sometimes via a distributor).¹⁰⁷
- Retailers ultimately sell the CRT products to class members.

The distribution system is largely the same for both CRT monitors and CRT TVs. For a graphical depiction of the distribution system, see Exhibit 11.

1. Direct purchasers

CRT manufacturers sell to two types of direct purchasers: CRT distributors (firms that distribute CRTs to others that incorporate the CRTs into CRT products) and product manufacturers (firms that incorporate CRTs into CRT products).

a) CRT Distributors

Distributors buy and sell large quantities of CRTs. CRT distributors are often affiliated with CRT manufacturers. For example, TAEC is a Toshiba subsidiary that functions as a distributor of Toshiba tubes in North America.¹⁰⁸ Other Defendants also have affiliated companies that act as CRT distributors.¹⁰⁹

b) Product Manufacturers

Product manufacturers obtain inputs, including CRTs, and assemble them into computer monitors and TVs. During the manufacturing process for computer monitors and TVs, the CRT itself is not modified, but is combined with other inputs to assemble the monitor or TV. Product manufacturers operate under a variety of business models; however, these firms all perform the same basic function—they manufacture monitors and TVs using CRTs. Listed below are descriptions of the various business models employed by product manufacturers.

- Original Equipment Manufacturers (OEMs) sell finished products under their own brand name. An OEM may be responsible for all the design and manufacturing of the finished

¹⁰⁷ Some product manufactures, such as Dell, also sell directly to class members.

¹⁰⁸ See, e.g.,

- Toshiba America, Inc. (TAI) is the 100 percent shareholder for TAEC. And Toshiba Corporation in Japan owns 100 percent of TAI. TAEC 30(b)(6) Deposition of Jay Alan Heinecke, 31 July 2012, p. 158.
- TAEC testified to that its role was to distribute Toshiba panels to customers in North America: “Q. Okay. If the CDT was coming to North America however, you would take title; TAEC would take title? A. If the -- if their -- yes. If it came into North America, TAEC was the sales arm to the monitor assembler.” TAEC 30(b)(6) Deposition of Jay Alan Heinecke, 31 July 2012, pp. 143:4-143:8.

¹⁰⁹ See, e.g.,

- LG.Philips Displays USA was LPD’s US distributor. A.A.M. Deterink, 28 August 2006, Trustee's Second Report in the bankruptcies of LG.Philips Displays Holding B.V. and LG.Philips Displays Netherlands B.V. and LG.Philips Displays Investment B.V., <http://deterinklive.com/nl/publicaties/faillissementsverslagen/l/>, accessed 12 July 2012 at 28.
- Samsung SDI America is Samsung’s US sales corporation for CPTs. Samsung, 2001, Consolidated Balance Sheets, SDCRT-0000039 - SDCRT-0000081 at 0050.

CRT product, but also may contract some, or even all, engineering and manufacturing to contract manufacturers (CMs).¹¹⁰

- Contract Manufacturers (CM) make components or finished CRT products for other suppliers of CRT products; these products are sold under the name of the customer ordering the product. There are two types of CRT contract manufacturers, Electronics Manufacturing Services (EMSs) and Original Design Manufacturers (ODMs).¹¹¹
 - EMS providers manufacture components and CRT products for their customers, but do not own the IP for the product or its design. EMSs may also provide additional services such as product design or supply chain management.
 - ODMs design and manufacture CRT products to be sold under their customers' brand name.¹¹² Unlike an EMS, an ODM generally owns or licenses the IP for the product and its design,¹¹³ but in some cases, ODMs design products according to customer specifications.¹¹⁴ ODMs also may perform all of the design work, offering products that are customized only by adding the customer's brand name prior to sale.¹¹⁵ ODMs

¹¹⁰ Even if assembly of the CRT product is carried out by a CM, the OEM may still negotiate directly with the CRT manufacturers for the terms and conditions on which CRTs will be delivered to the CMs.

¹¹¹ The distinction between ODMs and EMSs is diminishing as EMS providers acquire design capability. However, ODMs tend to specialize in only a few products where EMSs are usually engaged in a number of vertical product markets. 10 November 2005, An Interview with iSuppli's Jeffery Wu - ODM vs. EMS, what happens next?, EMSNow, <http://www.emsnow.com/npps/story.cfm?ID=15416>, accessed 18 June 2008, p. 1.

¹¹² “. . . an ODM is a company that manufactures products of its own designs, which are then sold under an OEM's brand name.” Weber, Austin, 01 February 2003, Outsourcing's Alphabet Soup, Assembly Magazine, http://www.assemblymag.com/copyright/9411390b7d5c9010VgnVCM100000f932a8c0____?view=print, accessed 18 June 2008, p. 1.

¹¹³ See, e.g.,

- ZDNet, 2007, ZDNet Definition for: Contract Manufacturer, <http://dictionary.zdnet.com/definition/contract+manufacturer.html>, accessed 17 June 2008, p. 1.
- “An ODM performs all the functions traditionally associated with EMS firms, in addition to actually designing products based on their own intellectual property.” Weber, Austin, 01 February 2003, Outsourcing's Alphabet Soup, Assembly Magazine, http://www.assemblymag.com/copyright/9411390b7d5c9010VgnVCM100000f932a8c0____?view=print, accessed 18 June 2008, p. 1.

¹¹⁴ “In the ‘Design It’ strategy, the OEM involves the ODM in the product design stage to different degrees, depending on the OEM's resource constraints and long-term R&D planning.” 10 November 2005, An Interview with iSuppli's Jeffery Wu - ODM vs EMS, what happens next?, EMSNow, <http://www.emsnow.com/npps/story.cfm?ID=15416>, accessed 18 June 2008, p. 1.

¹¹⁵ See, e.g.,

- “In the ‘Go Shopping’ strategy, the OEM purchases the ODM's fully designed and ready-made products and changes minor features such as label or casing to ensure time to market.” 10 November 2005, An Interview with iSuppli's Jeffery Wu - ODM vs EMS, what happens next?, EMSNow, <http://www.emsnow.com/npps/story.cfm?ID=15416>, accessed 18 June 2008, p. 1.
- Typically, ODMs determine what products to build and the OEM purchases the products ready-made. Weber, Austin, 01 February 2003, Outsourcing's Alphabet Soup, Assembly Magazine, http://www.assemblymag.com/copyright/9411390b7d5c9010VgnVCM100000f932a8c0____?view=print, accessed 18 June 2008, p. 1.

may manufacture products that are sold under many different brand names.¹¹⁶ In addition, some ODMs may also market products under their own brand name.¹¹⁷ ODMs may ship finished products directly to distributors or retailers, bypassing the OEM whose name appears on the product.

- Systems Integrators (SIs) operate very similarly to OEMs, but differ in that they make unbranded or “white-box” computer systems, including monitors. It does not appear that SIs or systems builders make TVs.

2. Indirect Purchasers

Product manufacturers sell CRT products either directly to retailers or to distributors that subsequently resell the CRT products to retailers. These retailers and distributors are indirect purchasers of CRT products; that is, they are not purchasing directly from the CRT manufacturers.

a) Product Distributors

Finished CRT products can be shipped to retail markets through independent distributors. These distributors are responsible for maintaining product inventory and preparing it for shipment. Distributors usually ship products to retailers that, in turn, resell to end customers; however, distributors sometimes drop-ship products directly to end customers who purchase through a retailer.

b) Retailers

Retailers sell finished CRT products to end consumers. These retailers include “big box” electronics retailers, specialty retailers, on-line merchants, and direct sales from OEMs to consumers. There are two general types of retail stores: brick-and-mortar stores (e.g., Best Buy, Radio Shack, Staples, Circuit City, Target, and Wal-Mart) and online retailers (e.g., Amazon.com, Buy.com, Dell.com, hp.com, Newegg, PC Mall).¹¹⁸

3. Final consumers (class members)

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- “Now the outsourcing decision is getting complex because of growing demand for original design manufacturers (ODMs). ODMs not only build a product, but also design it for an OEM. The ODM owns the intellectual property or they license it.” Carbone, Jim, 16 January 2003, ODMs offer design expertise; quicker time to market, http://www.purchasing.com/index.ASP?layout=articlePrint&articleID=CA269147&article_prefix=CA&article_id=269147, accessed 01 February 2008, p. 1.

¹¹⁶ “In many cases, the ODM will design and build products, such as VCRs or televisions, and sell the products to multiple OEMs. The OEMs then market the products under their own brand names.” Carbone, Jim, 16 January 2003, ODMs offer design expertise, quicker time to market, Purchasing, http://www.purchasing.com/index.asp?layout=articlePrint&articleID=CA269147&article_prefix=CA&article_id=269147, accessed 01 January 2008, p. 1.

¹¹⁷ BenQ, a CRT finished product manufacturer, employs both the ODM and OEM business model. 10 November 2005, An Interview with iSuppli’s Jeffery Wu - ODM vs EMS, what happens next?, EMSNow, <http://www.emsnow.com/npps/story.cfm?ID=15416>, accessed 18 June 2008, p. 1.

¹¹⁸ Generally, brick-and-mortar stores also sell some products online. In contrast, online retailers only sell online.

End-customers purchase CRT products for their own use and do not resell them. End-customers are indirect purchasers that typically purchase CRT monitors and TVs from retailers; however, in some circumstances they purchase CRT products directly from product manufacturers. In the latter scenario, end-customers are still indirect purchasers of CRTs since the product manufacturer is the entity that purchases CRTs and resells CRT products to the end-customers.

VII. Proof of anticompetitive conduct is common to all class members

The anticompetitive conduct alleged by Plaintiffs consists of the Defendants' price-fixing behavior: fixing prices, restricting capacity, allocating customers, and sharing sensitive information. Proving liability is common to all class members because it is related exclusively to actions taken by the Defendants. The evidence of Defendants' conduct will be found in Defendants' documents, such as the cartel meeting notes, and business records, such as sales prices and quantities. No information about putative class members is necessary to demonstrate that Defendants engaged in anticompetitive conduct. Proof that the Defendants engaged in illegal conduct is therefore common to all class members.

VIII. The conspiracy caused antitrust harm to all class members

I turn now to the effect of the Defendants' cartelizing conduct. I begin by showing that the cartel was successful at raising CRT prices above the competitive level. As I explained above, this cannot be done by simply collecting data on cartel prices and competitive prices and showing that one is greater than the other, because competitive prices are counterfactual and unobservable; they never existed because the Defendants formed the cartel. For this reason, I necessarily rely on a less direct approach. I show that the Defendants had the requisite power to raise prices; I show that the cartel set target prices above the competitive level, and that prices paid by consumers were approximately equal to the cartel's target prices; I show that the cartel followed operating practices known to have brought success to other cartels; I show that the Defendants (who were in a position to know whether they were raising prices) would have been behaving irrationally if they had not succeeded in raising prices; I show that, in the ordinary course of business, cartel members expressed their assessment that the cartel had raised prices above the competitive level. Based on this evidence, I conclude that the cartel was successful at raising prices.

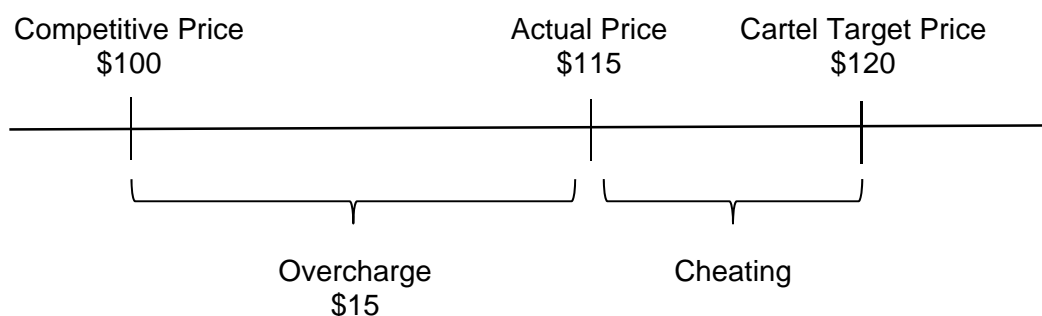
Next, I show that the anticompetitive harm caused by the cartel affected all direct purchasers. As a preliminary matter, I explain that product differentiators (such as flat screens) receive a price differential; these differentials establish a price structure. I show that rational cartelization requires that the cartel raise the entire structure above the competitive level. Next, I show that the target prices set by the cartel created a price structure, and that prices paid by direct purchasers exhibited a price structure similar to the structure in target prices. I show that basic economic theory establishes a mechanism by which all CRT prices are caused to be supra-competitive when the cartel sets a subset of prices above the competitive level. The same mechanism causes even the prices of cartel cheaters to be above the competitive level. All direct purchasers were therefore harmed by the cartel.

Next, I show that direct purchasers passed the cartel's overcharges along to all class members in the form of supra-competitive prices for finished products containing CRTs, televisions and monitors.

A. The cartel was successful at raising price

In this section of my report, I assess the evidence that the CRT cartel successfully raised prices above the competitive level. Such an assessment must recognize the fact that the competitive price (although estimable) is unobservable: because the cartel fixed prices and restricted output, the competitive price (which is what the price would have been in the absence of the cartel) never existed. The cartel overcharge, too, is unobservable, because it is the difference between the actual (observed) price and the competitive (unobserved) price.

To illustrate the information available for the assessment of the cartel's success, suppose that the competitive price of a good is \$100, that the members of a cartel agree to a target price of \$120, but all cartel members cheat on the agreement and charge \$115:



Despite the presence of cheating, the cartel illustrated above has succeeded in raising price \$15 above the competitive level (\$15 overcharge); even a leaky bucket can carry water. However, the data available to the researcher (and the Court) include the cartel target price (which is discoverable from cartel documents) and the actual price (which may be observed in firms' sales records), but not the competitive price. Estimating the competitive price is ordinarily done as a matter of course in the calculation of damages in price-fixing cases. I describe several methods common to all class members that are suitable for estimation of overcharge damages (and the competitive price of CRTs) in Section IX.C.

In the sections that follow, I show that the cartel said it would raise prices, that it possessed market power sufficient to raise prices, that it did the things successful cartels do, that it set target prices above the competitive level, that actual prices were close to cartel target levels, that the cartel members' willingness to incur the risk and expense of participating in a cartel demonstrates cartel members' belief that they were successful at raising prices, and that cartel members' own assessment, made in the ordinary course of business, was that the cartel had succeeded in raising price. I conclude that the cartel succeeded in raising prices above the competitive level, and that the anticompetitive harm caused by the cartel's overcharges was common to all direct purchasers.

1. The CRT cartel possessed market power

To raise price above the competitive level a cartel must possess market power.¹¹⁹ I begin my demonstration that the cartel raised prices of CRTs by showing that the cartel meets this

¹¹⁹ See Section V.B.1.

necessary condition. However, when, as here, there is compelling evidence that a cartel actually did raise price, logic does not require the demonstration of a necessary condition: accomplishing a goal is sufficient to show that conditions necessary to accomplish the goal were satisfied. I present evidence the cartel raised prices below, in Section VIII.A.3. First, I present evidence (other than evidence that the cartel raised price) that the cartel had market power.

a) The cartel restricted capacity to raise price

A cartel possesses market power if it can raise price by restricting cartel output.¹²⁰ The cartel restricted its members' capacity in order to raise prices repeatedly over a period of at least eight years.¹²¹ Cartel members thereby evidenced their belief that the cartel had market power, for without it, their on-going attempt to raise price by restricting capacity would have been irrational. Antitrust authorities recognize that conduct that would be irrational in the absence of market power is evidence of the possession of market power.¹²² It might be plausible that cartel members were mistaken in their belief that they had market power, if the cartel had tried to raise prices by restricting capacity and failed one or two times or for a short time period, but it is improbable that the cartel attempted the impossible over and over again for years without giving up. Cartel members were the leaders of a large industry, and should be presumed to know, after repeated attempts, whether they had succeeded in raising price by restricting cartel output. Given the on-going conduct, they must have believed they succeeded. The cartel's repeated efforts to raise price by restricting capacity are therefore consistent with the possession of market power by the cartel.

b) The cartel had a dominant market share

Identifying a market and computing market shares is an indirect means of assessing market power.^{123,124} The relevant antitrust market includes all products sufficiently substitutable with CRTs that a hypothetical monopolist over products in the market could set CRT prices above the

¹²⁰ Recall that market power is the ability to raise price by restricting output. Areeda, Phillip E., Hovenkamp, Herbert, and John L. Solow, 1995, *Antitrust Law: An Analysis of Antitrust Principles and Their Application*, Volume IIA, Little, Brown & Company: Boston, ¶501, p. 85.

Moreover, "restricting output" means that the cartel held output below the competitive level; "restricting output" does not necessarily mean that output decreases over time. See Section V.B.1.b).

¹²¹ See Section VIII.A.2.e) for evidence that the cartel restricted output and capacity.

¹²² "Some conduct benefits actors only if it supports supracompetitive prices. Because such conduct would be irrational for the perfectly competitive firm, its occurrence indicates that the defendant has (or believes it has) some degree of market power. The power can be that of an organized cartel, or of oligopolists managing to coordinate their prices at supracompetitive levels, or of a market's sole or dominant occupant." Areeda, Phillip E., Hovenkamp, Herbert, and John L. Solow, 1995, *Antitrust Law: An Analysis of Antitrust Principles and Their Application*, Volume IIA, Little, Brown & Company: Boston, ¶524a, p. 133.

¹²³ Areeda, Phillip E., Hovenkamp, Herbert, and John L. Solow, 1995, *Antitrust Law: An Analysis of Antitrust Principles and Their Application*, Volume IIA, Little, Brown & Company: Boston, ¶532a, p. 160 and 2010 Merger Guidelines (if not explicit in the guidelines, find a speech by Shapiro that DOJ agrees defining a relevant market is a means to an end). U.S. Department of Justice and Federal Trade Commission, 19 August 2010, 2010 Horizontal Merger Guidelines.

¹²⁴ This means of assessing market power is "indirect" in the sense that market power is inferred from market share. Direct evidence of market power is evidence that prices were above the competitive level, as in the cartel's elevation of CRT prices by restricting capacity described in Section VIII.A.2.e).

CRTs that a hypothetical monopolist over products in the market could set CRT prices above the competitive level by a small but significant amount for a non-transitory period of time.¹²⁵

Inference of market power from market shares can be sensitive to market definition issues: if a market is defined too narrowly, market shares may give a false indication of market power.¹²⁶

In this report, I do not reach any conclusions regarding the boundaries of the relevant antitrust market. Rather, I examine the shares of CRTs supplied by the CRT cartel, and the shares of all displays supplied by both the CRT cartel and the LCD cartel.

(1) The CRT cartel dominated the supply of CRTs

As I showed above, the CRT cartel dominated the supply of both CPTs and CDTs. See Exhibits 1, 5, and 6. Moreover, the CRT cartel possessed 89.0% of the capacity to produce CRTs; see Exhibit 12. Therefore, when the cartel restricted output of CRTs, that output reduction could not readily be offset by increased production of CRTs by non-cartel suppliers. I therefore conclude that buyers had few competitively-supplied CRTs available as alternatives to cartel-supplied CRTs.

(2) There were few competitively supplied alternatives to CRT cartel products

Functional alternatives to CRTs are LCD panels, plasma display panels, and projection tubes, as I explained above.

During much of the class period, the product that was perhaps most substitutable with CRTs was TFT-LCD panels. The supply of LCD panels was dominated by a cartel that was found by two U.S. juries to have been guilty of monopolization and to have charged supra-competitive prices for LCD panels.¹²⁷ Some members of the CRT cartel were also members of the LCD cartel, and

¹²⁵ This is according to the Department of Justice's "Hypothetical Monopolist Test", sometimes called the "SSNIP (small but significant and non-transitory increase in price) Test". U.S. Department of Justice and Federal Trade Commission, 19 August 2010, 2010 Horizontal Merger Guidelines, pp. 8-13. By this method, a relevant antitrust market is the smallest set of products over which a hypothetical monopolist, if one existed, could profitably set price above the competitive level.

¹²⁶ If a cartel's market share is calculated using a too-narrowly defined market, the total size of the market, which is the denominator in the market share calculation, is understated, causing the cartel's market share to be overstated.

¹²⁷ See, e.g.,

- United States Department of Justice, 12 November 2008, LG, Sharp, Chunghwa Agree to Plead Guilty, Pay Total of \$585 Million in Fines for Participating in LCD price-Fixing Conspiracies, http://www.justice.gov/atr/public/press_releases/2008/239349.htm, accessed 10 September 2012.
- United States Department of Justice, 10 March 2009, Hitachi Displays Agrees to Plead Guilty and Pay \$31 Million Fine for Participating in LCD Price-Fixing Conspiracy, <http://www.justice.gov/print/PrintOut2.jsp>, accessed 10 September 2012.
- United States Department of Justice, 13 March 2012, Taiwan-Based AU Optronics Corporation, Its Houston-Based Subsidiary and Former Top Executives Convicted For Role in LCD Price-Fixing Conspiracy, http://www.justice.gov/atr/public/press_releases/2012/281032.htm, accessed 20 September 2012.
- Musil, Steven, 03 July 2012, Jury finds Toshiba guilty of LCD price-fixing, CNET News, http://news.cnet.com/8301-1023_3-57466274-93/jury-finds-toshiba-guilty-of-lcd-price-fixing/, accessed 10 September 2012.

pled guilty to monopolization for their role in the LCD cartel.¹²⁸ There is evidence that CRT cartel members were aware that raising LCD prices would permit the cartel to keep CRT prices high.¹²⁹ Direct purchasers of displays therefore had few competitively-priced alternatives to cartelized CRTs.

c) Entry did not constrain the cartel's market power

I discuss entry and entry conditions in the CRT industry as part of my analysis of the effectiveness of the CRT cartel. Entry and entry conditions are relevant to this analysis because cartel success in the long run requires that the cartel be sheltered from the threat of competition from entrants. Accordingly, I seek to identify entry that reduces the cartel's overcharge.

I define "meaningful entry" to be entry by a non-cartel member that increases industry-wide CRT capacity. The introduction of incremental capacity that is not controlled by the cartel induces increased industry output, and therefore reduces price.¹³⁰ If an entrant simply acquires a cartel member's capacity and joins the cartel itself, entry is unlikely to have any significant effect on price, because it does not raise industry capacity, and does not affect the cartel's share of the industry's capacity. The cartel attempts to impose the monopolist's profit-maximizing price on the market; the monopoly price does not change when the identities of cartel members change.

In the remainder of this section, I show that there was essentially no meaningful entry in the CRT industry during the class period, and that entry was discouraged by chronic excess capacity in the CRT industry.

(1) Essentially no meaningful entry in the CRT industry

Two new CRT industry participants appeared late in the class period: Videocon entered the industry by acquiring all of the capacity of Thomson, a cartel member, in 2004 and 2005, and then Videocon joined the cartel; thereupon Thomson exited the CRT industry.^{131,132} This is not

¹²⁸ The LCD cartel included ten defendants (AUO, CMO, CPT, EIDC, HannStar, Hitachi, LGD, Samsung, Sharp, and Toshiba) and ten co-conspirators (Fujitsu, Hydis, Innolux, LG Electronics, Mitsubishi, NEC, Panasonic, S-LCD, Sony, and TPO).

¹²⁹ See, e.g.,

- In October [2001], Samsung, LPD, and Chunghwa "expressed satisfaction at the recent successful rise in TFT retail prices, believing it could help halt further prices drops in the downturn market for tubes," and also understood that TFT prices would increase \$10 in October, \$15 in November, and another \$5 in December. Chunghwa Picture Tubes, LTD, 23 October 2001, Visitation Report, CHU00028589 - CHU00028595 at 8589.01E and 8589.03E.
- Pricing decisions were put off until an executive-level meeting on December 28 [2001]. Makers hoped to take advantage of the LCD price increases, and had already indicated in the newspapers that a price hike was coming. Chunghwa Picture Tubes, LTD, 28 December 2001, Visitation Report (For Submission), CHU00031174 - CHU00031175 at 1174.01E-1175.01E.

¹³⁰ As I explained above, restricting output causes price to rise. See Section VIII.A.1.a). Similarly, increases in output cause price to fall.

¹³¹ Videocon acquired Thomson's plant in Italy in January 2004, and all of Thomson's remaining CRT capacity, located in China, Mexico, and Poland, in July 2005. Thomson Videocon I.F.A. Presentation, PHLP-CRT-005242 at 2-3 and Thomson, 2005, Thomson Exits Tube Business Ahead of Schedule, PHLP-CRT-030355 - PHLP-CRT-030372.

meaningful entry as I have defined it, because Videocon's entry did not bring any incremental capacity to the industry and Videocon took Thomson's place in the cartel.

Baoma began producing 14" CPTs in China in 2007 with a single production line it acquired from LPD's Barcelona plant.¹³³ Operations had ceased on the LPD production line prior to its acquisition by Baoma, so moving the line to China and placing it in service might be argued to have been an increase in industry capacity. In either event, because Baoma's entry was so small and so late in the class period it can have had no significant effect on the power of the cartel to raise prices on products purchased by U.S. consumers during the class period.¹³⁴

(2) Entry was discouraged by excess capacity of sunk capital

(a) Excess capacity induces cutthroat competition

It cannot be inferred from the absence of entry that the cartel was unsuccessful. While a cartelized industry may attract entry if cartel prices are high enough to permit above-normal profit, supra-competitive prices are not necessarily that high. As I explained above at Section V.A, in certain circumstances, an industry may be subject to below-normal profitability. When these circumstances are present, a cartel may price above the competitive level without attracting entry. Such circumstances are described by Areeda, Hovenkamp, and Solow:

When demand for a product declines, competition drives price below full costs, including a competitive return to capital; producers will continue to earn less than a competitive return until the excess capacity is withdrawn... Barriers to mobility prolong and magnify the losses; competition may become "ruinous"... Until it wears out, plant or equipment will continue in operation so long as price exceeds variable costs because some return on investment is better than nothing. Thus, price can fall and remain well below full costs for an extended period before capacities are reduced enough to restore profitable operations.¹³⁵

¹³² 22 August 2012, Indirect Purchaser Plaintiffs' Notice of Motion and Motion For Leave to Amend Complaint; Memorandum of Points and Authorities in Support Thereof, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division) (Hereinafter "Fourth Consolidated Amended Complaint"), ¶¶102-105.

¹³³ Baoma began production of CPTs in January 2007 at its facility in Changzhou, China. It had a single line producing 14" CRTs. The line was acquired from LPD. March 2007, SDI CRT Line Status, LGE00067202, tab "CHINA LOCAL".

¹³⁴ Baoma's capacity was only 83,000 units per month, or 1 million units per year. That is only 3% of 2006 industry production of almost 30,000,000 14" CPTs. LG Electronics, 06 March 2007, Global C-CRT Line Status, LGE00091909 and MT Picture Display, November 2006, Untitled Spreadsheet of CPT and CTV data, MTPD-0416090.

¹³⁵ Areeda, Phillip E., Hovenkamp, Herbert, and John L. Solow, 1995, Antitrust Law: An Analysis of Antitrust Principles and Their Application, Volume IIA, Little, Brown & Company: Boston, p. 50.

Buying new CRT capacity requires a large investment (see Section VI.B.3). When excess capacity causes producers to earn less than a competitive return on their investments, potential entrants will not make the large investments necessary to participate in the CRT industry.¹³⁶

Scherer and Ross, in a classic Industrial Organization textbook, call the phenomenon described by Areeda, Hovenkamp, and Solow the “sick industry problem”, and state conditions necessary for the problem to arise:

The cutthroat competition issue has two principal branches. One pertains to industries with chronic excess capacity because superior substitutes have appeared on the scene... the case of the secularly declining or “sick” industry. There are two chief prerequisites: capacity substantially in excess of current and probable future demands and rigidities that retard the reallocation of capital and/or labor toward growing industries. Then unless there is some artificial restraint such as ... tightly knit cartel agreements, competition is likely to drive prices down to levels that yield investors much less than a normal return on their capital. ... When firms’ cost structures include a high proportion of fixed costs, this profitless existence can continue for years or even (as in railroading and coal mining) for decades, since producers find it preferable to continue operation and cover at least their ... variable costs than to shut down.¹³⁷

I have already shown that the CRT industry suffered from chronic excess capacity throughout the class period, and that CRT manufacturing equipment cannot be used in other industries; see Sections VI.B.2VI.C.2 and VI.B.3. The CRT industry therefore satisfied the two conditions necessary for the “sick industry problem”. Under such conditions, entry is not to be expected.¹³⁸

Assessments of entry conditions made in the ordinary course of business are consistent with the existence of the “sick industry problem”. For example, in a document prepared for the purpose of evaluating the supply of credit to LG Philips Displays, a bank noted that

In recent years, there have been no new entrants into the industry, which is likely due to the relatively high costs of setting up a greenfield (de novo) CRT manufacturing facility with a minimum efficient scale, and the existing flexible swing and switchable production capacity.¹³⁹

¹³⁶ A standard finance textbook gives two equivalent decision rules for firms’ investments, one of which is to accept investments that offer rates of return in excess of their opportunity costs of capital, also known as above-normal returns. Brealey, Richard A., and Stewart C. Myers, 2000, *Principles of Corporate Finance*, Sixth Edition, McGraw-Hill College, p. 19.

¹³⁷ Scherer, F.M., and David Ross, 1990, *Industrial Market Structure and Economic Performance*, Third Edition, Houghton Mifflin Company: Boston, p. 294.

¹³⁸ “Entry is not to be expected when established firms are losing money, anticipating a market decline, or carrying large amounts of excess capacity. Nor is entry assured into a market earning only the competitive rate of return.” Areeda, Phillip E., Hovenkamp, Herbert, and John L. Solow, 1995, *Antitrust Law: An Analysis of Antitrust Principles and Their Application*, Volume IIA, Little, Brown & Company: Boston, p. 50.

¹³⁹ ABN AMRO Bank, N.V., Citibank/Salomon Smith Barney Hong Kong Limited, et al., May 2001, LG.Philips Displays Holding B.V. US\$2,000,000,000 Senior Term Loan and Revolving Credit Facility, PHLP-CRT-051982 - PHLP-CRT-052085 at 2058.

I described the flexibility of CRT productive capital to produce multiple models above in Section VI.B.2. The implication of this flexibility for an entrant is that incumbents can respond to entry by switching some of their capacity to produce CRTs in direct competition with whatever models an entrant decides to produce, making it difficult for an entrant to find a profitable niche.

In the same assessment, the bank went on to say,

The global CRT market is led primarily by Asian players. High entry costs and relatively low margins have deterred new players from entering the industry.¹⁴⁰

Another industry participant, when asked to describe the entry requirements in the industry, responded that “[t]here are not any barriers to enter the industry. However, it is very difficult to participate in the CPT business due to smaller profit and huge investment.”¹⁴¹ This evidence, too, is consistent with market conditions that sheltered the CRT cartel from competition from entrants.

The entry of Videocon and Baoma in 2005 and 2007 is consistent with a collapse in demand for CRTs. When the excess supply of CRT productive capital was at its worst, the price of CRT plant and equipment would have been low,¹⁴² reducing the investment necessary to enter, and thereby inducing entry.

(b) Holding excess capacity can deter entry by credibly threatening a price war

Economists have shown that the presence of excess sunk capital can deter entry, even though incumbents set prices above the competitive level. While prices may currently be high enough to make entry attractive, the presence of excess capacity makes known to potential entrants that incumbents have the ability to respond quickly and decisively with a price war if significant entry is attempted. When there is excess capacity, then, incumbents can impose overcharges, sheltered from competition by entrants.¹⁴³

(c) Entry was risky and significant lead time was required before investments were profitable

Entry in the CRT industry would require substantial lead time before any profit was realized: construction of a factory takes at least a year, and it is often six months to a year between the time a CRT manufacturer receives a finished product manufacturer’s request for a quote before mass production starts. See Section VI.A.3. Even for an incumbent with manufacturing facilities in place, the time necessary to re-enter production of a CRT model that it had not produced for a

¹⁴⁰ ABN AMRO Bank, N.V., Citibank/Salomon Smith Barney Hong Kong Limited, et al., May 2001, LG.Philips Displays Holding B.V. US\$2,000,000,000 Senior Term Loan and Revolving Credit Facility, PHLP-CRT-051982 - PHLP-CRT-052085 at 2058, 2067.

¹⁴¹ Toshiba, 06 November 2002, Q&A Part 1 Nov-7-2002, TSB-CRT-00030283 at sheet Q&A2.

¹⁴² “In dying industries, the value of capital is permanently less than replacement cost.” Carlton, Dennis, and Jeffery M. Perloff, 2005, *Modern Industrial Organization*, Fourth Edition, Addison-Wesley Longman, Inc., p. 249, footnote 4.

¹⁴³ Bulow, Jeremy, Geanakoplos, John, et al., March 1985, Holding Idle Capacity to Deter Entry, *The Economic Journal*, Vol. 95, 179-182.

year could inhibit re-entry of production of that model.¹⁴⁴ If an incumbent's re-entry of a model is inhibited by how long it takes for the money to start rolling in, then entry that required a new plant¹⁴⁵ must have been even more inhibited because building a plant adds at least an additional year to the lead time that inhibits an incumbent's re-entry.¹⁴⁶

Even once a plant was built, it might not be profitable initially,¹⁴⁷ for profitability requires operation at high levels of capacity utilization and high rates of yield (low rate of defective output); achieving high utilization and high yield could take some time, and potential entrants faced the risk that a plant could be plagued with difficulties long after it opened. See Section VI.B.3.

(d) Even incumbents made only limited investments in capacity

Investment conditions faced by an incumbent and investment conditions facing an entrant are not necessarily equal. An incumbent evaluates the profitability of *incremental* investments, given the existence of the capital it already has in place. Incumbents' capital includes, in addition to physical capital such as plants and production lines, all of the intangible capital an incumbent has acquired by participating in the market, such as brand capital (including its trademarks and reputation for quality), intellectual capital (such as patents), and human capital embodied in its employees (such as training and personal connections with customers and suppliers, and, in some cases, with "competitors"). Because incumbents possess this capital and potential entrants do not, investment may be economic for an incumbent but not for an entrant. For example, given that it already has a plant and a production line, an incumbent may find that it is profitable to invest in incremental capital to convert its production line from the production of round CRTs to the production of flat CRTs; however, such incremental investment does not necessarily mean that investment in a new plant and a new production line is economic for a potential entrant.

Even incumbents made only limited investments in productive capacity during the class period. Toshiba, in an exchange regarding industry conditions in late 2002, said that it was "[d]ifficult to make mid-term or long-term strategy and make new investments, due to unclear future market", and

¹⁴⁴ Cartel meeting notes describe Matsushita Electronic Corporation (Malaysia)'s consideration of re-entry of production of 15" CDTs, because sales of that model were "hot and brisk". However, it had stopped producing them for a year, and would need design-in with the customers and lead time of several months to prepare materials for production. According to the meeting notes, "There was a fear that when everything was *Ready* the 15" market situation would have changed and conversely become a burden. Thus, MMEC currently has not made the final decision yet." Chunghwa Picture Tubes, LTD, 01 October 1999, Contact Report, CHU00028432 - CHU00028433 at 8432.01E.

¹⁴⁵ Entry might require building a plant even if incumbents have excess capacity, because incumbents might prefer to hold a surplus plant rather than sell it to an entrant, if by selling it they weaken the cartel.

¹⁴⁶ Panasonic 30(b)(6) Deposition of Tatsuo Tobinaga, 16 July 2012, p. 146. See Section VI.B.3.

¹⁴⁷ "A new CPT plant was estimated by producers to cost \$70- to \$332 million and take up to two years to build. Merely to increase capacity by adding current lines was estimated to cost up to \$160 million and take up to two years to complete. Once established, furthermore, it is difficult to be profitable, at least initially, due to what the staff report cites as 'the need to operate plants at relatively high levels of capacity utilization.' And it's not even 'relatively'; it's high levels of capital utilization to be profitable." United States International Trade Commission, 17 February 2000, United States International Trade Commission In the Matter of: Color Picture Tubes from Canada, Japan, Korea, and Singapore, SDCRT-0068880 - SDCRT-0069081 at 8922.

“[d]ifficult to increase the capacity, due to unclear future market”.¹⁴⁸ Chunghwa said that “[d]ue to the consideration of the market trend, the present capital investment is limited.”¹⁴⁹ The president of Irico said that it “must stick to CPT even if it may be a road of no return, regardless of profit or loss” because it is not developing new products such as LCD panels, and it is “a government-owned enterprise and must protect its employees’ livelihood as its top priority.”¹⁵⁰ The reluctance of incumbents to invest in the CRT industry is consistent with industry conditions that sheltered the CRT cartel from competition from entrants.

(3) Conclusions regarding entry conditions

Competition from entrants presented no significant challenge to the power of the CRT cartel to impose overcharges on direct purchasers. There was very little entry, and the little that occurred was after the collapse of demand for CRTs in developed countries using cannibalized capacity or in league with the cartel, or both.

The absence of significant entry does not indicate the absence of cartel overcharges; chronic excess capacity in the industry accounts for the dearth of entry, and the implications of chronic excess capacity, accord well with industry conditions.

The fact that CRT prices were low enough to deter entry does not mean, however, that prices were at the competitive level. As I explained above, competitive prices are the prices that would have prevailed in the absence of the cartel; because of the existence of the cartel, competitive prices did not exist and hence were not observed. In a “sick industry”, competitive prices may be low enough that firms would have earned below-normal returns on their investment, absent the cartel. I show below, in Section VIII.A.3, that the cartel’s prices were above the competitive level.

d) Conclusions regarding market power

The CRT cartel supplied a dominant share of CPTs, CDTs, and all CRTs, and possessed a dominant share of industry capacity to produce CRTs. Early in the class period, the CRT cartel supplied a dominant share of all displays. After LCD panels became an important alternative to CRTs, the CRT cartel was sheltered from competition by the presence of the LCD cartel, and buyers had few competitively-priced alternatives to cartelized CRTs. The CRT cartel was also sheltered from competition from entrants. I conclude that the CRT cartel possessed sufficient market power to raise the prices of CRTs, if it operated effectively.

¹⁴⁸ Toshiba, 06 November 2002, Q&A Part 1 Nov-7-2002, TSB-CRT-00030283 at sheet Q&A2. This document contains answers written by the treasurer of Toshiba Display Devices (TDD) to questions posed by Deloitte and Touche in the context of Deloitte and Touche’s valuation analysis for TDD. TDD’s Horseheads, NY manufacturing facilities were acquired by Matsushita Toshiba Picture Display Corp. of America (MTPDA) when it was formed in 2003.

¹⁴⁹ Chunghwa Picture Tubes, LTD, September 2002, Company Profile Chunghwa Picture Tubes, Ltd., CHU00123024 - CHU00123067 at 3051.

¹⁵⁰ “President Gao stressed that on the one hand, Irico is a government-owned enterprise and must protect its employees’ livelihood as its top priority, but on the other hand, Irico is not developing new products, such as LCD and PDP. As a result, Irico must stick to CPT even if it may be a road of no return, regardless of profit or loss.” Chunghwa Picture Tubes, LTD, 20 August 2003, Marketing Contact Report, CHU00030068 - CHU00030069 at 0068.01E.

2. The CRT cartel engaged in the practices of successful cartels

Economists have identified a number of operating practices common to successful cartels. According to a widely used Industrial Organization economics textbook, these include¹⁵¹

- Fix more than just price,
- Divide the market,
- Fix market shares,
- Use most-favored-nation clauses and meeting-competition clauses, and
- Establish trigger prices.

Fixing more than just price (such as fixing market shares or assigning customers to suppliers) affords cartel members multiple opportunities to detect non-compliance with the cartel agreement. Fixing capacity is a readily-verifiable means of placing limits on cartel members' ability to cheat. Cheating can be discouraged by cartel members granting their customers most-favored customer clauses and meeting-competition clauses, which promise customers they will receive at least as low a price as that charged all other customers. Such terms reduce the incentive to cheat by requiring that discounts not be given opportunistically to capture incremental customers while continuing to charge higher prices to other customers, but must be given to all customers.

Two prominent cartel scholars found that other practices of successful cartels include¹⁵²

- Develop a hierarchy that includes both top-level executives and working-level members,
- Build trust,
- Employ multi-pronged strategies, and
- Learn from experience.

Next, I compare the practices of the CRT cartel to the practices proven to have been successful for other cartels.

a) The cartel established a hierarchy of meetings

Collusion among members of the cartel began at least as early as 29 May 1995, when LG and Chunghwa Picture Tubes met “to discuss the background for a CPT CDT price increase, and the price increase range as well as to exchange market information.” Notes of this meeting also show that communication regarding price increases had occurred or was planned with “all CPT/CDT Makers in Thailand, Malaysia and Singapore”, including Samsung, Toshiba, and Thai-CRT.¹⁵³ The information exchanged included current prices, plans for future prices, negotiations with customers, current and planned future capacity, and output.

¹⁵¹ Carlton, Dennis W., and Jeffrey M. Perloff, 2005, *Modern Industrial Organization*, Fourth Edition, Pearson Addison Wesley, pp. 139, 141-144.

¹⁵² Levenstein, Margaret, and Valerie Suslow, March 2006, What Determines Cartel Success?, *Journal of Economic Literature*, Vol. 44., pp. 43-44, 67.

¹⁵³ Chunghwa Picture Tubes, LTD, 29 May 1995, CPT Sales & Marketing Division Visiting Report, CHU00028933 - CHU00028945 at 8933.01E.

The CRT cartel set up regular meetings of cartel members' managers called "Glass Meetings" for the purpose of conducting cartel business, such as price fixing, and division of the market. The Glass Meetings continued at least through February of 2007.¹⁵⁴ Regular attendees of the Glass Meetings included Chunghwa, LPD (formerly LG and Philips), MTPD (formerly Panasonic and Toshiba), Orion (Daewoo), Samsung, and Thai CRT.

The cartel set up a hierarchy of three levels of meetings: Top Management Meetings, Management Meetings, and Working Level Meetings.¹⁵⁵ Top Level Meetings were generally held once or twice a year, sometimes as frequently as once a quarter, and were attended by high-ranking executives such as Presidents, Vice Presidents, and Chief Operating Officers.¹⁵⁶

¹⁵⁴ See, e.g.,

- Glass Meeting on 8 February 2007 with attendees Chunghwa, MTPD, SDI, and LPD. Jimmy, Wu, and Meng Ying, February 2007, Market Visitation Report (Glass Meeting), CHU00030437 - CHU00030438 at 0437.01E.

¹⁵⁵ See, e.g.,

- "Q. Now, were the glass meetings that you attended, were those – were there different levels of glass meeting? In other words, did you attend a type of glass meeting and then there were other levels of glass meetings that you were aware of? [objections omitted] THE WITNESS: Yes, basically all the meetings that are related to glass meetings, I attended all of them. Q. Were – was there a – were – were there different levels of executive that attended different meetings on behalf of Samsung SDI that were related to the glass meetings? [objections omitted] THE WITNESS: Yes. Q. Okay. And did they have – did those different levels of meeting have names? In other words, was one called a top meeting? [objections omitted] THE WITNESS: Yes. Q. Okay. And – and so what were the names of the various levels of meetings? [objections omitted] THE WITNESS: To my recollection there were top management meetings and management meetings, and there were also working level meetings." Samsung SDI 30(b)(6) Deposition of Jaemin Lee, Vol. I, 06 June 2012, pp. 30:22-32:2.
- A meeting held on 18 January 1999 planned for a Working Level Meeting on February 10 and a Top Meeting on March 5. Samsung SDI, 18 January 1999, CDT Industry (January 18, '99) Meeting Result, SDCRT-0086557 - SDCRT-0086560 at 6559E.
- A meeting held on 14 April 1999 planned for a Management Meeting on May 21 and a Top Meeting on May 25/26. Samsung SDI, 19 April 1999, Report on the April 14 Management Meeting Results, SDCRT-0086593 - SDCRT-0086596 at 6593E-6594E.

¹⁵⁶ See, e.g.,

- "Top meeting: once/quarter." Samsung SDI, November 1998, CDT Industry (11/28, 29) Meeting Results, SDCRT-0086445 - SDCRT-0086448 at 6445E.
- "Various makers agreed to change, from now on, to hold Top-Management meeting every 2 months and Working Level Meeting every month." Chunghwa Picture Tubes, LTD, 24 July 2001, Visitation Report (submitted), CHU00036384 - CHU00036385 at 6384.03E.
- "Q. And the top meetings that you attended with J.S. Kim in 2002 and 2003, approximately how often would they occur? [objection omitted] THE WITNESS: I think it occurred – they occurred once every three to six months." 07 June 2012, Deposition of Samsung SDI 30(b)(6) Witness Jaemin Lee, Volume II (Hereinafter "Samsung SDI 30(b)(6) Deposition of Jaemin Lee, Vol. II, 07 June 2012"), p. 226:8 - 13.
- "[W]e have held TOP MEETINGS 1 - 2 times a year." Samsung SDI, August 2005, Competitor China Visit Report, SDCRT-0091524 - SDCRT-0091530 at 1525E.
- "General meeting attended by the presidents of the 5 companies: 2nd meeting to be held end of Sept. to continuing [sic] from 1st meeting on July 19." Samsung SDI, 18 July 1998, 7th CDT Industry Meeting (July 18) Results, SDCRT-0086416 - SDCRT-0086418 at 6418.

Chairmanship of the Top Level Meetings was assigned to executives from different cartel members on a rotating basis.¹⁵⁷ The function of Top Level Meetings was to reach agreement about cartel policy, such as prices, capacity, and division of the market. Meetings of top executives also occurred on golf courses, in conjunction with Top Level Meetings; these were called Green Meetings.¹⁵⁸ Events such as these for top executives to socialize are opportunities for members of the cartel to form personal relationships and build trust between cartel members.¹⁵⁹

Management Meetings were held about once a month, sometimes as frequently as once a week, sometimes every few months.¹⁶⁰ The function of Management Meetings was to reach agreement

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- A Top Management Meeting on 28 September 2005 included SDI's Vice President and Sales Vice President, LPD's Chief Operating Officer and Sales Vice President, and Chunghwa's Senior Vice President. Chunghwa Picture Tubes, LTD, 28 September 2005, GSM Top Management Meeting, CHU00014230 - CHU00014231.

¹⁵⁷ See, e.g.,

- A Top Management Meeting notes document states: "A new chairman was selected [Bullet] Mr. Jim Smith was selected by Philips." Samsung Display Device, Philips, 20 August 2000, Top Management Meeting (August 20), SDCRT-0086675 - SDCRT-0086681 at 6676E.
- A meeting notes document states: "It was resolved that the next meeting would be held at [Chunghwa] in Taoyuan (5/22 PM 13 :00), SDI will be the chair." Chunghwa Picture Tubes, LTD, 18 April 2001, Overseas Visitation Report, CHU00024560 - CHU00024568 at 4560E.
- A Top Management Meeting notes document states: "TV GSM's [Glass Meeting] chairman will be [Chunghwa] for one year." Chunghwa Picture Tubes, LTD, 30 April 2003, CPT market Report (Overseas Trip Report), CHU00123742 - CHU00123745 at 3742.02E.
- A meeting discussion agenda states: "The 3 company meeting host (Chairman) has changed [pointing finger icon] SDI in '05 Yr. --> [Chunghwa] in '06 Yr." CDT, 13 March 2006, Main Discussion Agenda, SDCRT-0091715 - SDCRT-0091718 at 1717E.

¹⁵⁸ See, e.g.,

- Itinerary and arrangements for a Glass Meeting on 5 March 1999 and a Green Meeting on 6 March 1999. The Glass Meeting is evidently a Top Management Meeting because attendees include presidents and executive vice presidents from Orion, Samsung, Philips, LG, and presumably Chunghwa, who made the arrangements. 04 March 1999, Report (Submitted), CHU00021268 - CHU00021276 at 1269E.
- Itinerary for a Green Meeting held on the morning of 24 February 2005 with a Top Management Meeting scheduled for the same afternoon. Chunghwa Picture Tubes, LTD, 24 February 2005, CHU00661917, CHU00661917 - CHU00661928 at 1917.

¹⁵⁹ See, e.g.,

- "[I]n order to make friendly contacts and strengthen mutual trust, the makers agreed that every 3-4 weeks they would take turns to host a Green Meeting (only two members from each maker) after the meeting is over." Chunghwa Picture Tubes, LTD, 09 November 1999, Visitation Report, CHU00030916 - CHU00030918 at 0916.02E.
- Itinerary for a Green Meeting held at Country Height Golf Resort on 6 March 1999 includes an "Arrangement of awards for the Golf competition" 04 March 1999, Report (Submitted), CHU00021268 - CHU00021276 at 1268.01E-1268.02E.

¹⁶⁰ See, e.g.,

- "Q. Okay. Did – when those meetings occurred, did they – on the once a month – once a month basis, did those levels of meeting all occur on the same day? In other words, would you have a top management

about cartel policy such as prices and capacity, exchange market intelligence, and to monitor the implementation of cartel agreements, such as compliance with cartel prices and capacity restrictions. Management Meetings were attended by sales directors and managers.¹⁶¹ A third level of meetings, Working Level Meetings were held on a more regular basis, often in order to prepare for Management Meetings.¹⁶² Working Level Meetings were attended by sales staff and sometimes their supervisors.¹⁶³

meeting, a management meeting, and a working level meeting all occurring on the same day, that particular day of the month? [objections omitted] THE WITNESS: To my recollection, again it depended on the time period, but initially the management meeting was once a month, and working level meeting was so that we could prepare for the management meeting. So working level meetings were held on the same day as the management meetings or one day before the management meetings. In terms of the top management meetings, it would happen once every six months or a year. It was irregular, and it depended on the schedules of the top people, and it would be adjusted based on that.” Samsung SDI 30(b)(6) Deposition of Jaemin Lee, Vol. I, 06 June 2012, pp. 32:15-33:10.

- “Meeting on the monitoring of the implementation of the agreement reached among the 5 companies [Bullet] Quantity: Once/month [Bullet] Price: Once/month.” Samsung SDI, 18 July 1998, 7th CDT Industry Meeting (July 18) Results, SDCRT-0086416 - SDCRT-0086418 at 6418E.
- “Meeting running plan [finger icon] would be changed from current once a month meeting to quarterly or bi-monthly meeting.” CDT, 13 March 2006, Main Discussion Agenda, SDCRT-0091715 - SDCRT-0091718 at 9717E.

¹⁶¹ See, e.g.,

- A European TV Glass Meeting on 11 November 1999 was attended by a Director and Section Chief from Orion, two Directors from Samsung, and a Department Manager and Representative from LG, among other untitled participants from Philips and Chunghwa. Chunghwa Picture Tubes, LTD, 11 November 1999, Contact Report, Topic: European TV Glass Meeting, CHU00030917 - CHU00030919 at 0917.01E.
- A Glass Meeting on 22 April 2002 was attended by a Manager from SDI, an Assistant Manager from LPD, and a Manager and Assistant Manager from Orion, among other untitled participants from Chunghwa. Samsung SDI, April 2002, GSM Meeting Log in April of 2002, SDCRT-0087743 - SDCRT-0087744 at 7743E.
- A Glass Meeting on 8 September 2003 was attended by two Senior Managers from SDI, two General Managers from LPD, and a General Manager from MTPD, among other untitled participants from Chunghwa. CPT, 08 September 2003, CPT Glass Meeting Result Report, SDCRT-0088732 - SDCRT-0088733 at 8732.

¹⁶² See, e.g.,

- “Q. Okay. Did – when those meetings occurred, did they – on the once a month – once a month basis, did those levels of meeting all occur on the same day? In other words, would you have a top management meeting, a management meeting, and a working level meeting all occurring on the same day, that particular day of the month? [objections omitted] THE WITNESS: To my recollection, again it depended on the time period, but initially the management meeting was once a month, and working level meeting was so that we could prepare for the management meeting. So working level meetings were held on the same day as the management meetings or one day before the management meetings. In terms of the top management meetings, it would happen once every six months or a year. It was irregular, and it depended on the schedules of the top people, and it would be adjusted based on that.” Samsung SDI 30(b)(6) Deposition of Jaemin Lee, Vol. I, 06 June 2012, p. 32:15-33:10.
- “[Chunghwa] suggested that weekly meeting shall be called to review price increase status, all makers agreed and set a Meeting at [Chunghwa] Yang Mei factory on 3/27/97 at 9:30 AM, and setup the following dates for future meetings as follows for the time being: [break] 4/2: PH Taipei, 4/9: LG, 4/16: Daewoo 4/23: SDD [break] In order to strengthen communication, ensure price increases to succeed smoothly.”

Cartel members also met frequently outside of Glass Meetings, in bilateral meetings, on an *ad hoc* basis.¹⁶⁴ Besides meeting in person, they also communicated regularly by phone and fax.¹⁶⁵

Chunghwa Picture Tubes, LTD, 19 March 1997, Customer Contact Report, Main Contents 14"/15" CDT Price Opinion Exchange, CHU00028749 - CHU00028751 at 8750E.

- “Review of the implementation method of the Working Level weekly meeting: Each maker indicated that because of the success of Glass Meeting, everybody has been Enjoying Business this year. Now that the Slow Season is coming, everybody should continue to strengthen communications and contacts, so the weekly meetings should continue to be held on time. However, in order to make friendly contacts and strengthen mutual trust, the makers agreed that every 3-4 weeks they would take turns to host a Green Meeting (only two members from each maker) after the meeting is over.” Chunghwa Picture Tubes, LTD, 09 November 1999, Visitation Report, CHU00030916 - CHU00030918 at 0916.02E.
- “Various makers agreed to change, from now on, to hold Top-Management meeting every 2 months and Working Level Meeting every month.” Chunghwa Picture Tubes, LTD, 24 July 2001, Visitation Report (submitted), CHU00036384 - CHU00036385 at 6384.03E.
- “Future GSM schedule is temporarily set as: a. working level meetings: once quarterly (around the 20th of February, May, August & November) and b. management meeting to be held semi-annually (June and December).” Chunghwa Picture Tubes, LTD, 30 April 2003, CPT market Report (Overseas Trip Report), CHU00123742 - CHU00123745 at 3742.01E.

¹⁶³ See, e.g.,

- “Other than to be attended by sales staff for Southeast Asia at the *working level* meetings, the headquarters should also send sales or *marketing* supervisors to attend” Chunghwa Picture Tubes, LTD, 30 April 2003, CPT market Report (Overseas Trip Report), CHU00123742 - CHU00123745 at 42.01E- 42.02E.
- A Glass Working Meeting held on 15 November 2004 was attended by a Branch Manager and Section Chief from LPD, a Branch Manager and Section Chief from SDI, and untitled participants from Chunghwa. Samsung SDI, 15 November 2004, Report the results of the Glass working meeting on Nov. 15, SDCRT-0090350 - SDCRT-0090353 at 0350E.

¹⁶⁴ See, e.g.,

- Chunghwa Picture Tubes, LTD, 17 May 1996, Sales & Marketing Division Visiting Report, CHU00028809 - CHU00028810.
- Chunghwa Picture Tubes, LTD, 24 May 1996, Sales & Marketing Division Visiting Report, CHU00028968 - CHU00028969.
- Chunghwa Picture Tubes, LTD, 09 April 1998, Visitation Report, CHU00028642 - CHU00028644.
- Chunghwa Picture Tubes, LTD, 14 April 1998, Visitation Report, CHU00028254 - CHU00028256.
- Chunghwa Picture Tubes, LTD, 28 April 1998, Visitation Report, CHU00028647.
- Chunghwa Picture Tubes, LTD, 06 June 2001, Visitation Report (Submit), CHU00031137.
- Chunghwa Picture Tubes, LTD, 26 June 2001, Sales & Marketing Division Visiting Report, CHU00031141.

¹⁶⁵ See, e.g.,

- “Director Liu made a phone call to [Philips] manager Xiu-Li Lin on the spot and confirmed that [Philips] price [to AOC] in February was the same as [Chunghwa], and that the order volume was about thousands of units.” Chunghwa Picture Tubes, LTD, 20 February 1998, Customer Contact Report, CHU00028955 - CHU00028957 at 8956E.
- From SDI’s meeting notes: “Received other Philips information by fax”. Samsung SDI, 18 January 1999, CDT Industry (January 18, ’99) Meeting Result, SDCRT-0086557 - SDCRT-0086560 at 6560E.

Members of the cartel also visited each other's plants to monitor compliance with line shut-downs. See Section VIII.A.2.f) for a detailed discussion of monitoring plant shutdowns.

b) The cartel shared plans and information

Cartel members shared a wealth of information with each other relevant to the business of price fixing. They shared projections of demand,¹⁶⁶ current capacity,¹⁶⁷ projected capacity,¹⁶⁸ and

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- “In the event that there are any changes to the line operations plans, such changes should be reported to other companies by fax or other means in advance”. Samsung SDI, 19 April 1999, Report on the April 14 Management Meeting Results, SDCRT-0086593 - SDCRT-0086596 at 6593E.
 - In an internal e-mail, David Ross of CPTUK states that Leo Mink of Philips called him to confirm production shutdowns and ask for Chunghwa's cooperation. Ross, David, 03 January 2001, E-mail, RE: CPTUK Off-Days (Production Reduction) Plan, CHU00022696 at 2696.01E.
 - From meeting notes: “LPD and TSB believe that it is not necessary to meet so frequently, therefore, it was everyone's suggestion that the meeting would be held in the second month of each quarter in order to discuss current quarter situations as well as the next quarter...[Handwritten:] The regular private communications among each other should proceed continuously.” CPT, Yang, Sheng-Jen (S.J.), et al., 21 February 2003, Market Visitation (Glass Meeting) Report (For Submission), CHU00020660 at 0660.02E.
 - “No common understanding has been reached whether to reduce prices in the future or not, but it was agreed to increase the number of working level meetings. In the future, any price movement must be communicated by decision makers for prices through meeting or by telephone.” Yun, Ling-Yuan (Yvonne), 01 April 2005, General Sales Department Monitor Products Unit, CHU00005997 - CHU00006001 at 5998E.

¹⁶⁶ See, e.g.,

- A Contact Report between SDI and Chunghwa includes a global CDT demand projection of 87.2 million in 1998. Chunghwa Picture Tubes, LTD, 11 November 1997, Customer Contact Report, CHU00028685 - CHU00028686 at 686E.
- From meeting notes: “The demand for small/medium sizes [of CPTs] in Europe and the U.S. is pretty good but customers said it will become soft from October and it will drop 20% from November. The demand in Asia Pacific Region will remain strong until year end. However those customers who are the large-scale OEM orders, demand is expected to drop starting in November. Currently the delivery of 14" tubes is tighter than 20"/21" and based on current Q4 overall customer order prediction and output estimates (more holidays during year-end for Malaysia's NewYear/Christmas).” Chunghwa Picture Tubes, LTD, 22 August 2000, Visitation Report, Topic: Market Information Exchange and Price Review, CHU00029105 - CHU00029107 at 9107.01E.
- From meeting notes: “There is no unanimity on views of market demand among the makers. The final conclusion: according to the latest report in March from IDC, Desktop PC still has 8.7% growth in '01 when compared to '00, therefore, CDT demand is optimistically forecast to reach 118 Mpcs. However, the overall demand is in a slump, especially when recession continues in the U.S. market and has yet to see any sign of improvement in Q2. So the CDT demand for the entire year is pessimistically forecast at only 114 Mpcs.” Chunghwa Picture Tubes, LTD, 19 March 2001, Visitation Report (Submit), CHU00031111 - CHU00031112 at 1112.02E.
- A meeting report shows an LPD and Toshiba global demand forecast of 165 million CPTs in 2002 and an SDI forecast of 156 million CPTs. Samsung SDI, 06 December 2002, 3 Companies MTG Information (5th) - Result Report, SDCRT-0087934 - SDCRT-0087937 at 7936E.
- A Glass Meeting report shows a forecast of CDT demand in the second half of 2005. Samsung SDI, 04 July 2005, G/S MTG Result Report, SDCRT-0091656 - SDCRT-0091659 at 1658E.

¹⁶⁷ See, e.g.,

projections of excess supply.¹⁶⁹ Identifying particular market segments in which excess supply was expected helped the cartel to anticipate conditions in which price erosion was likely to

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- Meeting notes include CDT and CPT capacity information for SDD, LG, and Orion. CPT, 17 March 1995, 3/17 - 3/18 CRT Manufacturers Meeting, CHU00028565 - CHU00028566 at 8565E - 8566E.
 - Meeting notes include CPT capacity information for Chunghwa, LG, Orion, SDD, Thai-CRT, and Toshiba in 1st and 2nd Quarter 1999. 07 March 1999, Malay Meeting on Mar 07, CHU00029248 - CHU00029258 at 9253.
 - A Glass Meeting presentation includes CPT capacity information for SDI, LPD, Chunghwa, and Orion in 2nd Quarter and 3rd Quarter 2002. 28 May 2002, Glass Meeting, SDCRT-0007588 - SDCRT-0007594 at 7590-7591.
 - A Glass Meeting report includes CPT capacity information for MTPD, SDI, LPD, Thai-CRT, and Chunghwa in 2nd Quarter and 3rd Quarter 2004. Chunghwa Picture Tubes, LTD, 18 May 2004, Market Visitation Report (Glass Meeting), CHU00124024 - CHU00124031 at 4024.01E.
 - A meeting agenda includes current CDT capacity for SDI, LPD, and Chunghwa. Samsung SDI, 13 March 2006, Main Discussion Agenda, SDCRT-0091715 - SDCRT-0091718 at 1716E.

¹⁶⁸ See, e.g.,

- Notes from a 1999 meeting include projected small and medium CPT capacity for Chunghwa, LG, Orion, SDD, Thai-CRT, and Toshiba in 1st Quarter 2000. Chunghwa Picture Tubes, LTD, 21 September 1999, Visitation Report, CHU00029175 - CHU00029178 at 9177E.
- A 1999 Glass Meeting presentation includes projected CDT capacity information for Chunghwa, LG, Orion, Philips, and Samsung in the year 2000. Chunghwa Picture Tubes, LTD, 20 September 1999, Visitation Report (Submit), CHU00030855 - CHU00030868 at 0863E.
- Meeting notes include forecasted capacity changes for Philips, Thomson, SDI Germany, and Daewoo. Kim, Lak Jin, 17 May 2001, Meeting Result Report, SDCRT-0087667 - SDCRT-0087669 at 7668E.
- A 2002 Top Meeting presentation includes projected CDT capacity information for 2003, assuming line shutdowns at Sony and Toshiba and after a 20% shutdown of lines at Chunghwa, LPD, and SDI. November 2002, Itinerary, CHU00660501 - CHU00660514 at 0506-0508.
- Notes from a 2002 meeting include projected capacity for 14", 20", and 21" CPTs in 1st Quarter 2003 for Chunghwa, Thai-CRT, Toshiba, SDI, and LPD, as well as projected global capacity for each quarter of 2003. Chunghwa Picture Tubes, LTD, 17 December 2002, Market Visitation Report, CHU00030559 - CHU00030562 at 0559.01E.

¹⁶⁹ See, e.g.,

- In a section titled "Opinion Exchange regarding '95/'96 W/W [Worldwide] CDT Supply/Demand" from a Contact Report between SDD and Chunghwa: "Both sides reached a common understanding with regard to supply exceeding demand starting in the second half of 1996 (especially for 17')." Chunghwa Picture Tubes, LTD, 18 September 1995, Customer Contact Report, CHU00028865 - CHU00028867 at 8866E.
- A Contact Report between SDI and Chunghwa includes a global CDT supply and demand forecast which predicts a 21% oversupply situation in 1997 and a 13% oversupply situation in 1998. Chunghwa Picture Tubes, LTD, 11 November 1997, Customer Contact Report, CHU00028685 - CHU00028686 at 8686E.
- Glass Meeting materials from 1999 contain a supply-demand comparison for 2000 based on Philips' demand forecast. Global CDT capacity is 149,428,000 while global CDT demand is 105,300,000, which represents an oversupply of 42%. Chunghwa Picture Tubes, LTD, 20 September 1999, Visitation Report (Submit), CHU00030855 - CHU00030868 at 8865E.
- A presentation from a 2002 Top Meeting has a capacity scenario page which shows a CDT oversupply situation of 22% in 2002 and 28% in 2003. November 2002, Itinerary, CHU00660501 - CHU00660514 at 0506-0507.

occur, and to prepare for those conditions. For example, if the cartel expected excess supply, it could prepare by shutting down production lines to prevent price from falling. See Section VIII.A.2.e).

Cartel members also shared information with each other regarding their negotiations with customers, including the names of customers to whom they were selling and with whom they were in negotiations, the products they were selling, their quantities, and their prices.¹⁷⁰

Cartel members also shared information regarding their plans for the introduction of new products.¹⁷¹

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- “In the long run, the market will still be oversupplied as a result of the shrinking demands for small sizes [of CPTs].” Chunghwa Picture Tubes, LTD, 25 May 2006, Visitation Report, CHU00036398 - CHU00036401 at 6498.02E.

¹⁷⁰ See, e.g.,

- Meeting notes show Chunghwa and SDD comparing current 14” and 15” CDT selling price for specific customers (e.g., ACER, ADI, Lite-on). SDD also shares its October sales volume. Chunghwa Picture Tubes, LTD, 30 October 1997, Customer Contact Report, Main Content 14”/15” CDT Price Discussion, CHU00028687 - CHU00028688 at 8688E.
- Meeting notes from a Europe Glass Meeting include a 14” CPT price comparison (current and planned) of Philips, Chunghwa, Orion, and SDD regarding specific customers (e.g., MIVAR, Matsushita), as well as sales information (e.g. Philips supplying 20K to Vestel in 2000). Samsung SDI, 11 November 1999, Europe Glass Meeting, SDCRT-0086512 - SDCRT-0086513 at 6512E-6513E.
- Meeting notes include a sales forecast for Philips, Thomson, Daewoo, and SDI German in May 2001 by specific customer, as well as a review of 2nd Quarter prices by product (e.g. Philips 21” CPT) and specific customer (e.g. BEKO, Sanyo, and MIVAR). Kim, Lak Jin, 17 May 2001, Meeting Result Report, SDCRT-0087667 - SDCRT-0087669 at 1-2.
- Glass Meeting notes include the 2nd Quarter 2004 sales of MTPD, SDI, LPD, Thai-CRT, and Chunghwa, as well as a review of their current 14” CPT prices to specific customers (e.g., Funai, JVC, Sanyo) and their future asking prices. Chunghwa Picture Tubes, LTD, 18 June 2004, Marketing Visitation Report (Glass Meeting), CHU00030526 - CHU00030529 at 0526.01E-0528.01E.
- A meeting presentation includes CDT sales of Chunghwa, LPD, and SDI for 1st Quarter 2005, as well as price information for specific customers (e.g., SEC, LGE, AOC) by supplier. Samsung, 26 April 2005, Agenda, SDCRT-0091634 - SDCRT-0091639 at 1635-1638.

¹⁷¹ See, e.g.,

- From meeting notes between Chunghwa and Philips: “After the meeting, Jim talked to me alone and expressed that the expectation for next year’s market is not as good as for this year but the [Chunghwa] production, on the contrary, will increase from 3M this year to 4 M, which will cause big impact on the market. Accordingly, he hoped [Chunghwa] could have a second thought. I said that [Chunghwa] didn’t intend to disturb the market and it is a sincere gesture to limit itself from taking orders from customers which have conflicting interests or to inform PH first before taking orders. Besides, the growth in quantity this year is mostly from [Chunghwa’s] original own customers and [Chunghwa] didn’t fight for orders viciously against PH. Next year, [Chunghwa] will introduce 15” flat tube but the impact should not be too big. Jim still hopes [Chunghwa] can control the production quantity.” Chunghwa Picture Tubes, LTD, 23 June 2000, Visitation Report, Topic: TV Tube Market, CHU00029110 - CHU00029115 at 12.01E.
- A meeting notes document talks about the schedule for each company’s introduction of 21” PF (Iron Mask) in 2004 and 2005, which has been led by MTPD. MT Picture Display, 17 September 2004, CRT Industry Meeting, MTPD-0580795 at 0795.

c) The cartel allocated customers to suppliers

The cartel divided the market using two schemes. Major customers were allocated to individual cartel members, a primary supplier and one or more secondary suppliers.¹⁷² Primary suppliers' prices were fixed by the cartel at levels slightly below the prices set by the cartel for secondary suppliers.¹⁷³ The differential between the primary and secondary suppliers' prices induced

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- From meeting notes between LPD and MTPD: "Both the parties have exchanged CRT product roadmaps including information of slim tubes of LPD and D-com, D-sup concepts of MTPD." Engelsen, Daniel den, Brouwer, Wim, et al., 06 December 2004, Visit Report to MTPD in Takatsuki, PHLP-CRT-027718 - PHLP-CRT-027721 at 7720.
 - From meeting notes between Chunghwa and Thai-CRT: "Therefore, ThaiCRT was aggressively developing 15"RF. Although the plan is to have mass production after Q3, it was quoting low prices everywhere. From what we have heard, it has quoted Usd 28.0 to our main customer Orion [Underlined by hand], increasing the pressure on us to drop price with Orion. Therefore, we must accelerate speed in bringing out our 15"RF A/K tube so that we can maintain and strive for orders with the support of competitiveness in cost." Chunghwa Picture Tubes, LTD, 27 May 2005, Foreign Business Trip Report, CHU00732798 - CHU00732899 at 2899.01E-2899.02E.
 - From Glass Meeting notes: "Both SDI (C) and BMCC projected to mass produce 21" super slim [Underlined by hand] in October this year; LPD(I) [Underlined by hand] also projected mass production in Q1 next year." Chen, Hwang-Yun (Henry), Chen, Mu-Lin (Jimmy), 22 September 2005, Market Visitation Report (Glass Meeting), CHU00030472 - CHU00030473 at 0473.01E.

¹⁷² See, e.g.,

- "Still strong feeling about: [para.] Vestel is oriented to have TH [Thomson] as 1st supplier and SDI as 2nd source while...Beko oriented to LPD as preferred supplier and SDI and [sic] 2nd source." Samsung SDI, 04 December 2003, Paris Meeting, SDCRT-0088661 - SDCRT-0088674 at 8672.
- "JVC [:] SDI/T-CRT will be the two suppliers. (The LPD model has been eliminated.) Based on S Company's intention, the G/L setting was lowered." MT Picture Display, 18 June 2004, ASEAN MTG (Small and Mid-Sized Units), MTPD-0493552 - MTPD-0493554 at 3553.
- "SDI suggests each customer should have a major vendor to control price/QEY [sic] [quantity] to gradually to [sic] reach that goal that each customer only have two CDT makers for supply." CPT, 24 August 2005, Letter head: Hongxi Creek Resort Ta Shee Resort, CHU00017115 at 1.
- "Agreed on the introduction of the 2 Vendor System by each customer for co-survival of 3 companies from '06...M/S details (agenda) from each customer will be discussed in the Working-Level meeting." Samsung SDI, 30 September 2005, G/S MTG Result Report, SDCRT-0091687 - SDCRT-0091691 at 1689E.

¹⁷³ See, e.g.,

- "PH/OEC asked [Chunghwa] to contact IRICO, and explain to IRICO the group's unanimous acknowledgement of its primary position to VESTEL. The three parties will not contact VESTEL for promotions this year and hope that next year, IRICO can increase price to \$30 (without tax). PH guarantees that its price can be higher than IRICO's by \$1, and the largest supply amount will not be more than 20-25 k/m, and if possible, he will visit IRICO (Date: October 11, awaiting for confirmation from PH [Underlined by hand])." Chunghwa Picture Tubes, LTD, 02 October 1999, Business Report Summary, Topic: European 14" CTV Tube Market, CHU00029048 - CHU00029049 at 9048.01E.
- "[bullet] In order to have stable price it is necessary to have big difference of share and reasonable price gape [sic] between major & minor supplier. [bullet] At least US\$0.5 price gap between Major & minor supplier." Chunghwa Picture Tubes, LTD, 17 June 2003, TOP Meeting Arrangement, CHU00660561 - CHU00660574 at 0573.
- "Being a secondary supplier, SDI is supposed to inform the primary supplier before sending a quotation, and is supposed to keep a US\$0.5~1 price differential. If SDI could quote LiteOn a price at US\$1 higher

customers to make a larger share of their purchases from primary suppliers than from secondary suppliers. For many major customers, such as AOC, Lite-on, LGE, Philips, Proview, and SEC, the Cartel also established targets for the shares of the customer's purchases to be supplied by each of the cartel members to which the customer was allocated.¹⁷⁴

The cartel also divided the market as a whole by establishing target shares of all CDT sales for each cartel member.¹⁷⁵

than CPT's in July, why is it now quoting the same price?" Chunghwa Picture Tubes, LTD, 23 December 2003, Return-from-abroad Trip Report, CHU00031221 - CHU00031226 at 1223.01E.

- "The top six major customers are AOC, Philips, EMC, L-On, SEC and LGE. The rest are in the 'other customers' category. To top six customers, 2nd tier suppliers must quote a price \$0.5 higher. This is to take this opportunity to reinforce price differentials between big and small customers for the purpose of stabilizing market shares." Chunghwa Picture Tubes, LTD, 25 March 2004, Return-from-Abroad Trip Report, CHU00031240 - CHU00031247 at 1242E.
- "The above is the 17^F baseline prices of TOP 6 Customers. LPD suggested that each major supplier of major customers could suggest adjustment to the baseline price of that customer, and the other two CDT makers can then adjust their prices according to the new baseline price and maintain the price differential. [Chunghwa] and SDI agreed in principle but this arrangement must be carried out under the premise of actual true baseline prices." Chunghwa Picture Tubes, LTD, 29 December 2004, CDT Market Report, CHU00071480 - CHU00071482 at 1480E.

¹⁷⁴ Most instances of this conduct of which I am aware were allocations of shares of CDT customers to cartel members; I am aware of one instance in which a CPT customer was allocated to cartel members. See, e.g.,

- "Mr. Na hoped that they could cooperate closely with [Chunghwa] on delivery quantity/price [to ADI] for mutual benefit. He hoped that delivery amount could be maintained at the original 80K/m Base. SDD would take 50K/m (60%) and [Chunghwa] 30K/m (40%) of M/S." Chunghwa Picture Tubes, LTD, 09 April 1998, Visitation Report, CHU00028642 - CHU00028644 at 8642.03E.
- Regarding division of a CPT customer: "With Thai-CRT/TEDI's promise that they would not grab Chunghwa Picture Tube's M/S orders (maintained at the original 50%) and that they will follow the prices, the Korean makers requested Chunghwa Picture Tube to take the lead in the price up to USD 32.00/pcs for Shipment to Orion (Thai) in January (Mr. Moon said he could arrange a meeting for the three top decision makers to confirm actual implementation method)." Chunghwa Picture Tubes, LTD, 27 November 1998, Visitation Report (Submit), CHU00029259 - CHU00029261 at 9261.01E.
- "In addition, with regard to each maker's share with A.O.C., it was reviewed and set as follows: [Chunghwa]: 50% PH: 20% SDD/ORION: 30% (SDD and Orion will review as to how to share that 30%)" Chunghwa Picture Tubes, LTD, 18 May 1999, CPT Sales Department Customer Contact Report, Topic: China/AOC 14" CDT Price, CHU00030763 - CHU00030765 at 0764E-0765E.
- Chunghwa, LPD, and SDI review their market share allocations for 12 major CDT customers as decided in a CEO meeting. CDT, 29 April 2003, Agenda, CHU00660539 - CHU00660548 at 0545-0546.
- Agreement between Chunghwa, LPD, and SDI on market share allocation for 6 (reduced from 12) major CDT customers. Allocations for LGE, Philips, and Lite-On have already been decided; they are working on a consensus for SEC, AOC, and Proview. Chunghwa Picture Tubes, LTD, 24 February 2005, Itinerary, CHU00647932 - CHU00647943 at 7941-7942.
- Proposal by Chunghwa, LPD, and SDI for market share allocations in 2006 for 6 major CDT customers. CDT, 13 March 2006, Main Discussion Agenda, SDCRT-0091715 - SDCRT-0091718 at 1718E.

¹⁷⁵ See, e.g.,

- Agreed CDT market shares of Chunghwa, LPD, and SDI for 2002 and 2003, with a comparison to actual results. Samsung SDI, February 2003, Agenda, SDCRT-0088763 - SDCRT-0088772 at 8767.

d) The cartel set prices

The cartel agreed to fix prices on numerous occasions. A list of documents demonstrating cartel members' agreement to fix prices is in Exhibit 2.

e) The cartel imposed output and capacity restrictions

The cartel agreed to restrict output and capacity on numerous occasions. At times, these agreements were for the temporary shutdown of particular production lines for a fixed period of time; the effect of temporarily shutting down production lines is to reduce output during the time lines are not operating, and thereby raise price.¹⁷⁶ Other capacity restrictions took the form of

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- Agreed CDT market shares of Chunghwa, LPD, and SDI for 2003 and 2004, with a review of actual market shares for January 2004. Samsung SDI, January 2004, Agenda, SDCRT-0088846 - SDCRT-0088851 at 8848.
 - Agreed CDT market shares of Chunghwa, LPD, and SDI for 2005, with a review of actual January and February 2005 market shares. Chunghwa Picture Tubes, LTD, 24 February 2005, Itinerary, CHU00647932 - CHU00647943 at 7935.

¹⁷⁶ See, e.g.,

- Meeting notes have attached production control tables: "3. Respective makers to reduce production days in order to control output quantity. [break] 4. In order to maintain original M/S as a principle, respective makers must not use the opportunity to acquire original delivery volume of other makers due to price increase. [break] Remark: SDD provided production control table for all makers is hereby copied, revised and attached as an appendix." Table contains worldwide CDT production volumes. Chunghwa Picture Tubes, LTD, 25 February 1997, Customer Contact Report, CHU00028760 - CHU00028766 at 8760.02E - 8762E.
- "Reached an agreement to reduce the production of 17" CDT [Bullet] Factory operation to be adjusted first to stabilize the price [Arrow] 3/4 quarter capacity: 5.5 million units, actual production: agreed to reduce to 3.9 million units, reached a 25% prod. reduction. [Bullet] Also, companies agreed to reduce production by further 4% in order to maintain the price 17" screens at US\$ 93." Samsung SDI, 31 July 1998, 8th CDT Industry Meeting (July 31) Results, SDCRT-0086419 - SDCRT-0086420 at 6419E.
- "[Bullet] Up to now, the capacity adjustment for 17" CDT's has been proceeding smoothly as a result of cooperation among the companies. [Bullet] In June, 17" CDT production will stop for 5 days (25 operating days) to adjust the actual production volume in order to maintain the price level." Samsung SDI, May 1999, Report on the CDT management meeting results (May of '99), SDCRT-0086632 - SDCRT-0086633 at 6632E.
- "(E) Working Day Reduction: Nov' 00 Resolution: [para.] The market demand in November is worse compared to October, in order to maintain the stability of pricing, a stricter control of the output volume is needed. Thus, the shutdown days for 15"/17" production line should be increased to 9 days from 7 days in October." Chunghwa Picture Tubes, LTD, 25 October 2000, Visit Report, CHU00031075 - CHU00031087 at 1076.01E.
- "In order to maintain pricing of 13V in Europe, and to smooth out the 20V price increase implemented by PH/SDI, PH proposed to have each of the 13 V manufacturers reduce workdays in 1Q in order to control inventory. PH (Spain plant) has decided to change the 7 days per week production to be closed on every weekend to hold off production. PH is also requesting [Chunghwa] and Orion to decrease production simultaneously and inform them of the dates when productions are to be held-off...While the pricing of 13V is not out of control yet in Europe, shall we accommodate the PH's request and provide them with the dates of planned production reduction (in principle, we will hold off production for same amount of days as PH)." Ross, David, 03 January 2001, E-mail, RE: CPTUK Off-Days (Production Reduction) Plan, CHU00022696 at 2696.01E.

agreements by the cartel to permanently shut down particular production lines.¹⁷⁷ The effect of permanent shut downs of lines is to reduce cartel members' ability to produce output, which raises price, and reduces cartel members' ability to cheat on cartel prices and output.

f) The cartel established monitoring and enforcement procedures

The cartel monitored compliance with temporary line shutdowns by sending representatives of the cartel on site visits to verify that production had halted.¹⁷⁸ Defendants provided the names of

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- “(E) Line Stoppage Days for April Each maker reported on the number of days of downtime planned: [Chunghwa] - 14 days, Philips - 14 days, LG - 14 days, and SDI - 12 days. The final resolution is to have 14 days of downtime for the month of April. As for Orion, it still needs further confirmation before giving a reply.” Chunghwa Picture Tubes, LTD, 19 March 2001, Visitation Report (Submit), CHU00031111 - CHU00031112 at 1112.02E.

¹⁷⁷ See, e.g.,

- A CDT line shut-down plan from a 30 May 2003 meeting presentation shows an agreement for Chunghwa to reduce capacity from 10 current lines to 9 in June and 8 in July, for LPD to reduce capacity from 11.5 current lines to 10.5 in June, and for SDI to reduce capacity from 11.5 current lines to 9.5 in July. CDT, 30 May 2003, Agenda, CHU00660549 - CHU00660560 at 0559.
- A CDT line shut-down plan from a 2 March 2004 meeting shows an agreement for Chunghwa to reduce capacity from 8 current lines to 7 lines, for LPD to reduce capacity from 11 current lines to 8.5 lines, and for SDI to reduce capacity from 8.5 current lines to 7.5 lines in the first quarter of 2004. Samsung, 02 March 2004, Itinerary, SDCRT-0090258 - SDCRT-0090266 at 0262.
- “Shutdown plan and execution: According to resolutions made during previous meetings, starting in January, each maker is to shut down 1 production line. LPD has shut down one line in Korean factory, SDI has converted half a production line in each of its Korean and Shenzhen factories to production of CPT. However, comparing the post-shutdown production capacity with February orders, the utilization rates of the production lines of the three makers dropped significantly; about 50% for [Chunghwa], 66% for LPD and 66% for SDI. At present customers recognize the severe oversupply of CDT and repeatedly demand price cuts. During the meeting, LPD suggested speeding up the implementation of second production line shutdown in order to effectively control the imbalance between supply and demand. It was temporarily decided that the implementation of the shutdowns shall proceed prior to June.” CPT, 24 February 2005, CDT Market Report, CHU00014200 at 4201E.
- A CDT capacity control plan from a 28 June 2005 shows a three-step shutdown agreement for 2005, which involves Chunghwa reducing capacity from 8 lines to 5 lines, LPD reducing capacity from 9.5 to 6.5 lines, and SDI reducing capacity from 9.5 lines to 6.5 lines. Samsung SDI, 04 July 2005, G/S MTG Result Report, SDCRT-0091656 - SDCRT-0091659 at 1657E.

¹⁷⁸ See, e.g.,

- Notes from a management meeting detail the monitoring of SDI's Busan and Suwan factories by Chunghwa and Orion and the monitoring of Chunghwa's Malaysian factory by SDI. SDI's instructions for its inspectors are: “It should be confirmed whether the #5 line is operating. The line should be checked twice, in the morning and in the afternoon. Please transmit the monitoring results via Single.” The notes also indicate that Chunghwa and Orion monitored LG's Gumi and Changwon factories for nonoperation on April 17 and 18, and LG monitored Orion's factory for nonoperation on April 18. Samsung SDI, 19 April 1999, Report on the April 14 Management Meeting Results, SDCRT-0086593 - SDCRT-0086596 at 6596E.
- From CDT meeting notes: “Results of the monitoring of Philips' Dapon factory [list format] 1) Date: June 24, '99 [...] 2) Item: #5 line in the Dapon factory [...] 3) Result: #1, 19", #5 17" lines not operating.” Samsung SDI, 23 June 1999, Report on the results of the 5 CDT companies' management meeting (June 23), SDCRT-0086641 - SDCRT-0086645 at 6643E.

the auditors they intended to send to other companies at meetings, and designated “principal” and “supporting” auditors for each company.¹⁷⁹ Cartel members also created “audit plans” and submitted them to the cartel.¹⁸⁰

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- Report meeting notes document: “1. The purpose of this trip is to AUDIT LINE 2 at SSDD’s Shenzhen factory to see if it has shut down 17” CDT production according to agreement. [...] 3. After obtaining permission from SSDD, I CHECKED [sic] their production line on 4/9 and 4/10, its original tube, coating, sealing, exhaust gas, ITC, etc. manufacturing process and found that LINE#2 only produced 14” CDT.” Chunghwa Picture Tubes, LTD, 09 April 2000, Visitation Report, CHU00030998 at 998E.
 - From CDT meeting notes: “(A) Follow-up of last meeting: Audit Control: [Chunghwa] reflected the Audit of the shutdown situation on 10/8 in LG Wales factory, [Chunghwa] people found that LG had not implemented shutdown according to the original plan. Mr. Choi of LG replied that they will investigate and respond, but LG has shut down for over 8 days due to the bad order condition this month.” Chunghwa Picture Tubes, LTD, 25 October 2000, Visit Report, CHU00031075 - CHU00031102.

¹⁷⁹ See, e.g.,

- From a meeting document and handwritten notes: “Auditor names from [Chunghwa], LPD, SDI (Bruce Lu, Eddie MEI from [Chunghwa]; JH Oh, JS Kim from LPD; Jay Jeong and JH Choi from SDI).” Samsung, 21 October 2004, SDCRT-0090233, SDCRT-0090233 at 122.
- An e-mail from JK Cesar Jung, Key Account Manager at LG.Philips Displays, discusses a meeting where auditors would be selected to check on production line shutdowns: “Dears, [...] As already informed, the meeting will be held on [sic] 2 pm ~ tomorrow. The following will be discussed [...] 2. Line shut-down [bullet] prepare the name list of the auditor (2 people) [bullet] relevant audit will be arranged as of Dec/end.” Song, Inhwon, 28 December 2004, E-mail, Subject: Fwd: RE: [Dec 29th] Working level meeting -----> from 15:30, CHU00735283 - CHU00735286 at 5284.
- A meeting notes document contains a table of auditor names by company as well as another table indicating which cartel members were “principal” and “supporter” inspectors for each manufacturing plant. Chunghwa Picture Tubes, LTD, 29 December 2004, Sales Headquarters Display products Sales Department CDT Market Report, CHU00126131 - CHU00126136 at 6132E-6133E.
- In a capacity control discussion from meeting notes: “They agreed to a Line Audit by 2 people having Free Pass, without prior notice at each company.” Samsung SDI, 19 January 2005, G/S MTG Result Report, SDCRT-0091599 - SDCRT-0091604 at 1602E.

¹⁸⁰ See, e.g.,

- Meeting notes have a production control and auditing plan for the 17” CMT [CDT] in May 1999 for Chunghwa, SDD, LG, Orion, and Philips. Chunghwa Picture Tubes, LTD, 12 May 1999, Contact Report, CHU00030757 - CHU00030762 at 0762E.
- “Ultimately, a resolution was reached by everyone that a minimum of seven days stoppage will be implemented in August. In addition, as for LG’s combined line of 15” and 17”, meeting attendees all expressed objections that as production days of 15” can be converted as 17” stoppage days, LG was asked to review and make improvement. Meeting attendees resolved that each company shall report its production stoppage and Audit plans on the weekly meeting to be held on 7/28.” Chunghwa Picture Tubes, LTD, 23 July 1999, Visitation Report, Topic: CDT Market Information Exchange and Price/Production Volume Review, CHU00030809 - CHU00030814 at 0810.01E - 0810.02E.
- “(C) 17” CDT stoppage days of various makers’ production lines in August: Various makers reported the number of stoppage days as shown in the attachment. They needed to verify Audit plans and send them to PH for compilation before Friday. Also, makers need to notify visiting/hosting staff and specify time of plant visit two days before Audit.” Chunghwa Picture Tubes, LTD, 28 July 1999, Visitation Report, CHU00030807 - CHU00030815 at 0808.01E.

The cartel monitored its agreements to fix price and restrict quantity. As described above, cartel members shared information regarding sales, negotiations, and prices; they also received feedback from customers about the prices being offered by other cartel members. When information received from these two sources was in conflict, cartel members challenged each other in cartel meetings.¹⁸¹ The cartel threatened cheaters with punishment in the form of price

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- “Meeting attendees agreed that, in order to effectively ensure price level, 17" tube production shutdown period needs to be at least 5 days in September. Each maker will provide a production stoppage plan before 8/24, and complete Audit plans for related factory zone before 8/28.” Chunghwa Picture Tubes, LTD, 20 August 1999, Visitation Report, CHU00030835 - CHU00030843 at 0837E.
 - Meeting notes have attached line-stoppage and audit plans: “Each maker's reported line-stoppage and Audit plan is attached. It was agreed that two days prior to the Audit date, the makers should notify one another of the visitors/hosts. The actual time to factory, then, does not need to be verified. Mr. Ha indicated that the makers needed to implement an actual Audit. He also made a simple record to facilitate reports from Management meeting.” Chunghwa Picture Tubes, LTD, 27 September 2000, Visitation Report (Submit), CHU00031067 - CHU00031073 at 1067.02E-1069E.

¹⁸¹ See, e.g.,

- “President Lin indicated that after the *Top Level* reached a conclusion regarding the price issue, the *Working Level* personnel should actually *Review* the market price situation at each meeting, and if abnormality appears, then they should find out the real price. The saboteur will be questioned thoroughly. The matter will then be reviewed at the *Top* meeting to seek a solution.” Hsieh, Chun-Mei (Christina), 13 October 1999, Contact Report, Meeting Topic: CDT Regular Exchange Meeting, CHU00030888 - CHU00030893 at 0890E.
- “As to our question that SDI is Offering Thomson a lower price in order to grab orders (200k for the first half of 2001), SDI responded that its price remains at \$25.5. Although those on the front line window believe that price should be lowered, upper management has yet to authorize such a move. Based on the request from Thomson, a price decision should be made within 1 week.” Chunghwa Picture Tubes, LTD, 21 December 2001, Visitation Report (Submitted), CHU00036406 - CHU00036407 at 6406.02E.
- “SDI flatly denied our suspicion that it has offered Sharp-Spain with prices as low as (ITC EU\$34=U\$23). We explained that considering manufacturing cost in Europe factories, such low prices should not have been offered in EU market. However, it admitted that its upper management offered Thomson \$24.2 in first quarter in order to grab orders with low price, but they later increased its 10" price to balance it out after consideration. CPT stressed that such a practice is wrong and CPT's share at Thomson cannot be grabbed by SDI.” 22 February 2002, Visitation Report, CHU00036394 - CHU00036395 at 6395.01E.
- “First of all, LPD questioned the announced total sales volume of SDI and its somewhat concealment on its deliveries made to SEC and Proview, since there are significant differences from the data obtained by LPD. It tried to switch focus and complained that the agreed upon market share ratio by the three makers are unrealistic; followed by attacking SDI is secretly causing trouble with AOC. Actual delivery in June and July is far higher than the data announced.” Yun, Ling-Yuan, 21 July 2003, CDT Market Review, CHU00005963 at 5963.01E.
- “When it was mentioned that the agreed price of the three companies was violated, there was no notice to our company while starting business to Proview, and our company sought the understanding of both companies when starting with Philips, Lite-On Biz and so on, they said that they would talk again to the head office. However, when our company denies this by saying, ‘Is it not \$43.5 that is our company’s price of Proview’, they then requested confirmation once again.” Samsung SDI, 15 November 2004, Report the results of the Glass working meeting on Nov. 15, SDCRT-0090350 - SDCRT-0090353 at 0351E.
- “During the meeting, we objected to LPD's lowering its prices to AOC secretly, reporting a lower-than-actual shipment volume and eroding our market shares, LPD's only response was to deny.” Chunghwa Picture Tubes, LTD, 29 March 2005, CDT Market Report, CHU00014202 - CHU00014206 at 4203E.

competition from the cartel.¹⁸² The cartel's monitoring and punishment efforts induced cheaters to comply with cartel policies on at least several occasions.¹⁸³

g) The cartel used most-favored customer clauses

Cartel members employed most-favored customer clauses in purchase agreements.¹⁸⁴ As I explained above, these terms promise customers they will receive prices no worse than prices

¹⁸² See, e.g.,

- "14" CDT, under the circumstances such that the market as a whole has not tended toward worsening, [Chunghwa] still maintains its original selling price foundation to all its customers. Even Mag/Delta, etc., who are eager to get into exports, also conform to original foundation quotes. Requested that TSB understand, and not be misled by its customers, maintaining 14" selling price together. But if the 14" price war really begins, TSB should understand that [Chunghwa] has the best capabilities to respond accordingly. At that time, TSB 14" CDT operations will be even more difficult." CPT, Du, Ching-Yuan (Michael), 17 June 1996, Customer Contact Report, CHU00028297 - CHU00028298 at 8297E.
- "PH commented that if SDD continued to disrupt the 14" market, there is no guarantee that it will follow rules with the 15"/17". If SDD's misconduct is not corrected, PH would be forced to take drastic actions under the pressure of high inventory." Chunghwa Picture Tubes, LTD, 13 January 1999, Visitation Report, CHU00030698 - CHU00030700 at 0698.03E.
- LPD proposal: "Penalty if company cheat prices (1) Person in charge & manager will be dispelled (2) Other 2 company [sic] will attack trouble maker's major customer." Samsung SDI, 2002, SDCRT-0087953, SDCRT-0087953 - SDCRT-0087962 at 7953E.
- "SDI's M/S for SEC changed from Q1/85% --> Q2/80%, September only has 70% or so. If [Chunghwa] does not cooperate, then SDI has to lower the price for SEC, or to fight for share in AOC or L-On." CPT, 24 August 2005, Letter head: Hongxi Creek Resort Ta Shee Resort, CHU00017115 at 2.

¹⁸³ See, e.g.,

- "Director Liu said that SDD's use of bottom price had caused harm to [Chunghwa]. He asked SDD to find a way to remedy. For example, at present, regarding Acer, the greatest harm, Director Liu asked him to raise the price to USD64.00/pc or restrict its supply volume on the ground that the output was not smooth. Mr. Lee claimed that it was Mr. Park at its Malaysia plant who had quoted to Acer USD 60.00/pc for 14". Although it does not violate its policy, he would try to find out whether there would be remedial measures, and would discuss this matter again at the formal meeting at 5:00 PM on 2/25/97." Chunghwa Picture Tubes, LTD, 24 February 1997, Customer Contact Report, Contents Exchange of Opinions Regarding 14" CDT Price, CHU00028763 - CHU00028767 at 8764E.
- "Regarding LG's offer of less than \$93 for 17" screens [bullet] LG asserted that the offer below \$93 is a rumor and agreed not to offer below \$93 in the future." Samsung SDI, 31 July 1998, 8th CDT Industry Meeting (July 31) Results, SDCRT-0086419 - SDCRT-0086420 at 6420E.
- "Director Liu explained that although LG still has some under the table conduct, but being under the supervision by everyone, they are being pushed towards making most offer at the agreed bottom price." CPT, Liu, et al., 25 August 1998, Sales Department Customer Contact Report, CHU00028463 - CHU00028464 at 8464E.
- "[Chunghwa] complained of efforts by SDI to grab orders for Thomson 14" by lowering prices, growing from 3-5K/M to 30K/M. In defense, SDI said its quoted price is \$25.5 sold jointly with 10" and that although the customer had requested a price reduction, that has not been approved. [Chunghwa] questioned that SDI's increase in orders was already a fact and had a clear impact on [Chunghwa] deliveries. Finally, SDI indicated that it plans to reconfirm the sales prices and make a report at the next meeting. If low pricing can be proven, it will then readjust the price back to the agreed prices between various parties." Chunghwa Picture Tubes, LTD, 18 January 2002, Visitation Report, CHU00036392 - CHU00036393 at 6392.01E.

charged other customers, and help to maintain cartel discipline by raising the cost of cheating: if a cartel member cheats by offering low prices to one customer, it has to offer the same low prices to all customers that have been granted most-favored customer status. See Section VIII.A.2.

h) Conclusion

The operating practices employed by the CRT cartel could make a case study in the effective cartel practices described in Section VIII.A.2. It employed multiple redundant controls, such as fixing both prices and capacity; cartel members communicated often, at high levels and low levels of management, sharing a wide variety of sensitive information relevant to price fixing; it created opportunities for trust-building among cartel members. These practices, when employed by a cartel with market power, can be expected to successfully raise price above the competitive level.

3. The cartel succeeded in charging supra-competitive prices

a) Members' continued participation in the cartel demonstrates impact

¹⁸⁴ See, e.g.,

- From a JVC purchase order with Hitachi America (the ordered product is a CPT): "Seller represents and warrants that the prices are no higher than are currently available from Seller to any other purchaser of similar quantities of substantially identical goods. Any taxes with respect to or on account of the goods ordered hereunder shall be paid by Seller unless expressly otherwise prescribed by law." JVC, 30 July 1998, JVC Purchase Order, HEDUS-CRT00062277 - HEDUS-CRT00062278 at 2277.
- From an e-mail from Chunghwa to Dell: "We've understood that there's some rumor about [Chunghwa's] Jan pricing, yet it's totally untrue. We haven't [sic] quoted Jan price to any customers at this moment. [para.] You may have our words that you have the MFN among our customers." Wang, Cherry H.C., 08 December 2004, MFN, CHU00635116 at 5116.
- From a general purchasing agreement between Matsushita Electric Industrial and Philips Consumer Electronics: "Supplier shall at all times offer the most favourable prices for the Standard Products only to Buyer, meaning that such prices shall be no less favourable than those currently extended to other customers of Supplier at substantially the same timing, under substantially the same purchase volumes and other conditions." Matsushita Electric Industrial, Philips Consumer Electronics, 20 January 2006, General Purchasing Agreement, MTPD-0436378 - MTPD-0436396 at 6384.
- From a meeting presentation between Chunghwa and SEC: "[Chunghwa] will provide MFP (Most Favorable Price) to SEC to secure 410K q'ty. If 37" q'ty exceed 260K, 1% incentive will be granted. Review shipment record by quarter, as well as incentive." Chunghwa Picture Tubes, LTD, 21 April 2006, Samsung & CPT Top management meeting, CHU00011820 - CHU00011839 at 1827.
- From a purchasing agreement between MTPD Indonesia and Sanyo Electronics Indonesia: "The price of the Products shall be decided by the parties hereto upon mutual consultation from time to time; provided, however, prices for the Products shall at no time be greater than the most favorable prices extended at that time to the Seller's most favored customers, taking into account the deference of specifications and delivery terms." PT Sanyo Electronics, PT MT Picture Display, 09 October 2006, Basic Agreement between PT Sanyo Electronics and PT MT Picture Display, MTPD-0336313 - MTPD-0336331 at 6316.
- From an E-Mail from Chunghwa to Philips: "We provide favored-nation price to Philips and need Philips to mask the price. Please help to confirm the acceptance of 17" final pricing (\$127.5) and the mask pricing (\$128.0)." Wang, Cherry H.C., 26 October 2006, RE: OCT pricing, CHU00633824 - CHU00633826 at 3825.

Firms will not participate in an illegal cartel unless they expect it to be successful, and each year for twelve years the cartel members chose to participate in an illegal cartel, which demonstrates that the cartel raised prices above the competitive level.

(1) Firms will not participate in a cartel if they don't expect it to succeed

For firms to participate in a cartel, members of the cartel must expect the cartel to be able to raise the price above the competitive level by an amount sufficient to compensate cartel members for the expense and risk of participating in the cartel.¹⁸⁵ The cost of sending executives to meetings is an example of one of the expenses of participation. For illegal cartels, the cost of participation also includes the expected cost of being caught: attorney fees, criminal fines, civil damages, and, for executives of the corporation, the costs of incarceration. It is not certain that a cartel will be caught by antitrust authorities. Therefore these costs are discounted to account for the probability of being caught and successfully prosecuted. In the event of successful prosecution, the costs are quite significant.¹⁸⁶

Cartel members knew that their participation in the cartel was illegal. Cartel meeting notes refer to methods of evading antitrust laws¹⁸⁷ and cartel members operating surreptitiously to avoid

¹⁸⁵ See, e.g.,

- “Three major factors are necessary to establish a cartel. First, a cartel must be able to raise price above the noncartel level without inducing substantial increased competition from nonmember firms... Only if a cartel is expected to raise the price above the noncartel price and keep it high do firms join. [footnote:] If the noncartel price is close to the cartel price, then firms may not believe that joining the cartel is profitable given the legal liability they potentially face from belonging to a cartel.” Carlton, Dennis and Jeffery M. Perloff, 2005, *Modern Industrial Organization*, Fourth Edition, Addison-Wesley Longman, Inc., p. 131.
- “[F]irms will make the attempt only if the cartel is expected to be sufficiently profitable.” Levenstein, Margaret, and Valerie Suslow, March 2006, *What Determines Cartel Success?*, *Journal of Economic Literature*, Vol. 44, 43-95, p. 48.
- “Firms may collude if the incremental payoff generated by the overcharge is more than sufficient to cover the cartel costs.” Boyer, Marcel, and Rachidi Kotchoni, March 2011, *The Econometrics of Cartel Overcharges*, Scientific Series.

¹⁸⁶ See footnotes 38 and 39.

¹⁸⁷ See, e.g.,

- In 1996, Chunghwa invited Hitachi's Mr. Kimura “to participate in the next discussion with CRT factories,” but “Mr. Kimura's face showed reluctance. Arranging this meeting with CPT and [Samsung] exposes him to high risk.” Chunghwa Picture Tubes, LTD, 25 November 1996, Sales & Marketing Division Visiting Report, CHU00028396 - CHU00028400 at 8397E, emphasis added.
- Regarding a proposal at one cartel meeting, it was noted that “Taiwanese, Japanese and Korean makers find it impossible to blatantly hold such a conference (Especially the Japanese because of their scruple of the U.S. finds it even more impossible to attend such meeting).” Therefore, “[e]ach Member should station representatives in Korea, Japan and Taiwan to participate in such meetings; to commonly draft Guide Line targeting market condition and Monitor system to monitor the actual action of each Member.” Lin, and Du, Ching-Yuan (Michael), 14 January 1998, Customer Contact Report, CHU00028263 - CHU00028264 at 8263.01E
- “The industry meetings should remain confidential in consideration of international antitrust laws.” Shenzhen Samsung Display Device, 05 August 1999, The Chinese Industry Meeting (August), SDCRT-0086672 - SDCRT-0086674 at 6672E.

detection.¹⁸⁸ The activities of the cartel were not only a violation of U.S. law, they violated the law in Japan, too.¹⁸⁹ Cartel members therefore knew that by participating in the cartel, they were risking significant costs.

Because participation in the cartel required members to incur significant costs, they must have expected to realize significant increases in price, since firms will not participate unless they expect the cartel to be able to raise the price above the competitive level by an amount sufficient to compensate cartel members for the expense and risk of participation.

(2) Participating in an illegal cartel for over twelve years makes no sense unless expectations of success were realized

The CRT cartel lasted longer than 90% of cartels whose duration was analyzed in a recent meta-study of cartel studies.¹⁹⁰ Because the expectation of success is a necessary condition for firms to participate in a cartel, we may safely conclude that throughout the class period, cartel members

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- “Since the contents of current *GSM* meetings often leak, Mr. Jerry Lin asked all the attendees try not to *make meeting minutes* and only to keep the relevant *Marketing Survey*. In order to avoid the meeting content leaking out again, Mr. Jerry Lin also suggested limiting each maker to 2 attendees for both *Top Meetings* and *Working level meetings*.” Chunghwa Picture Tubes, LTD, 26 May 2000, Visitation Report, Topic: CDT Market Information Exchange and Price/Production Volumes Review, CHU00031006 - CHU00031009 at 1007.02E.
 - A cartel meeting document contains the following: “The Method to avoid anti trust law [bullet] Participant of Top/Management [bullet] Place {Korea/Taiwan), Expense, Accommodation, Communication.” Samsung, 17 August 2004, Itinerary, SDCRT-0090328 - SDCRT-0090338 at SDCRT-0090338.
 - “Will try to prevent Glass Meetings from being investigated for violation of antitrust law (rumor about LCD)” (7/28/04) Samsung, 21 October 2004, SDCRT-0090233, SDCRT-0090233 at 87-89, 96-113.
 - From CDT industry meeting notes: “Visited Matsushita July 16 as the representative of Japanese cathode ray tube (CRT) representative and provided information on the agreements reached by 5 Korean and Taiwan companies [Bullet] Expressed their intention to participate actively [Bullet] Caution against ANTITRUST LAWS.” Samsung SDI, 18 July 1998, 7th CDT Industry Meeting (July 18) Results, SDCRT-0086416 - SDCRT-0086418 at 6417E.

¹⁸⁸ See, e.g.,

- A cartel meeting document contains the following: “The Method to avoid anti trust law [bullet] Participant of Top/Management [bullet] Place {Korea/Taiwan), Expense, Accommodation, Communication.” Samsung, 17 August 2004, Itinerary, SDCRT-0090328 - SDCRT-0090338 at SDCRT-0090338.
- “Method to avoid antitrust law – Participant of top management; place (Korea/Taiwan), expense, accommodation, communication” (9/20-21/04). Samsung, 21 October 2004, SDCRT-0090233, SDCRT-0090233 at 87 – 89, 96-113.
- From CDT industry meeting notes: “Please dispose of this material after reading it.” Samsung SDI, December 1998, CDT Industry (12/9, 10) Meeting Results, SDCRT-0086449 - SDCRT-0086454 at 6449E.
- From a meeting discussion agenda: “Action plan for meeting security”. CDT, 13 March 2006, Main Discussion Agenda, SDCRT-0091715 - SDCRT-0091718 at 1717E.

¹⁸⁹ McKenzie, Liz, 07 October 2009, JFTC Slams Samsung, MT Picture in CRT Cartel Probe, Law360, http://competition.law360.com/print_article/126904, accessed 08 October 2009.

¹⁹⁰ The CRT cartel operated during the class period, nearly thirteen years. Levenstein and Suslow studied the longevity of 50 cartels; 45 (90%) of them lived eleven years or less. Levenstein, Margaret, and Valerie Suslow, March 2006, What Determines Cartel Success?, *Journal of Economic Literature*, Vol. 44, 43-95, p. 52.

expected the cartel to raise price above the competitive level. To demonstrate cartel success, then, all that remains to be shown is that cartel members' expectations were realized. This follows from the fact that cartel members had, by the end of the class period, over twelve years of experience operating the cartel, had the opportunity to withdraw from the cartel at any time, yet year after year they continued to participate. Whether to participate in a cartel is a significant business decision, and should be presumed to have been made rationally, taking proper account of the relevant costs and benefits, using the best information available. Assessing the success of the cartel at raising prices would have been central to evaluating the decision to continue to participate in the cartel. Cartel members were well placed to know whether the cartel was succeeding. They demonstrated their belief that the CRT cartel succeeded in raising prices above the competitive level by continuing to bear the expense and risk of participation in the cartel year after year. The judgment of industry leaders, made in the ordinary course of business, is powerful evidence, and this evidence demonstrates that the cartel successfully raised prices above the competitive level.

b) The cartel set target prices above the competitive level

Because cartel members must be compensated for the expense and risk they incur by participation in a cartel, a cartel will set target prices above the competitive level. To do otherwise would be to establish failure of the cartel as a goal, and to ensure that the costs of participation would not be recompensed. Prices at or below the competitive level can be achieved without incurring the expense and risk of participation in a cartel. Therefore, I conclude that the target prices set by the cartel were above the competitive level.

c) Cartel members' prices were near cartel target price levels

Next, I examine prices actually charged by the Defendants to test whether they were close to the cartel target prices. Note that because target prices are above the competitive level, actual prices close to the cartel target price are proof that actual prices were above the competitive level. The converse is not true, however: if actual prices are below the target prices, I cannot conclude that the cartel did not raise price. The existence of some cheating is not dispositive that the cartel was unsuccessful.¹⁹¹

(1) Cartel target price data

I obtained cartel target price data from cartel meeting notes. I determine that the cartel collusively set a price when the cartel meeting notes indicate that agreement on price was reached among the representatives of the cartel members attending the meeting. Meeting notes generally give the month the collusive price is to take effect¹⁹² and a description of the products

¹⁹¹ See Section V.B.2.b).

¹⁹² I used the following criteria to establish the target price each month for a particular type of CRT sold by a particular defendant: (i) I assume that target prices are only effective for any month that began within sixty days of when the price was set; (ii) the target price each month is the most recently fixed price prior to the first of the month, if such exists; (iii) otherwise, the target price is the earliest price set by the cartel, unless it was fixed after the tenth of the month, in which case I assume there was no target price for that type of CRT that month.

whose price was fixed, including the application (monitors or TVs), size, shape (flat or round),¹⁹³ and whether the CRT is sold bare or ITC.¹⁹⁴

The cartel target prices I have collected do not include all prices fixed by the cartel. Discovery is ongoing and the record continues to develop. In addition, to my knowledge, my cartel target price data contain no prices fixed bilaterally on the phone; if target prices were set bilaterally on the phone, we may never have any evidence of them. I know that some target prices were set bilaterally,¹⁹⁵ I know that cartel members phoned each other;¹⁹⁶ and I know they discussed price on the phone.¹⁹⁷ It is likely that cartel members fixed prices bilaterally on the phone, but I have not found dispositive evidence of target prices that were set bilaterally on the phone.⁴

(2) Cartel sales price data

I obtained sale prices from sales data produced by six of the defendants.¹⁹⁸ The sales data contain revenue and units sold by CRT model.¹⁹⁹ After cleaning the data,²⁰⁰ I partitioned the CRT observations into sets of models I call “groups”. The models within each group share the

¹⁹³ When cartel meeting notes do not indicate that target prices are for flat CRTs, I treat them as prices of round CRTs.

¹⁹⁴ Some meeting notes include agreements to fix price but do not specify detailed characteristics of the products. I exclude from the analyses of target prices target prices for which meeting notes do not specify application, size, and finish (bare or ITC).

¹⁹⁵ See, e.g.,

- Chunghwa Picture Tubes, LTD, 18 July 1997, Visitation Report, CHU00028707 - CHU00028710 at 8707E.
- Chunghwa Picture Tubes, LTD, 26 November 1996, Customer Contact Report, Main Content Market Information/Pricing Discussion, CHU00028776 - CHU00028780 at 8778E.
- Chunghwa Picture Tubes, LTD, 20 February 1998, Customer Contact Report, CHU00028955 - CHU00028957 at 8956E.

¹⁹⁶ See, e.g.,

- Liu, Chinh-Chun (C.C.), 10 June 1997, MON 14" Discussion (6/9 in Korea), CHU00028962 - CHU00028963 at 8963E.
- CPT, DU, Ching-Yuan (Michael), 22 February 2000, Sales Department Customer Contact Report, CHU00028382 at 8382E.
- Chunghwa Picture Tubes, LTD, 21 December 2001, Visitation Report (Submitted), CHU00036406 - CHU00036407 at 6407E.
- Chunghwa Picture Tubes, LTD, 29 March 2005, CDT Market Report, CHU00014202 - CHU00014206 at 4242.02E.

¹⁹⁷ Chunghwa Picture Tubes, LTD, 06 November 1997, Report, CHU00028958.

¹⁹⁸ Chunghwa, Hitachi, Panasonic, Philips, Samsung, and Toshiba produced sales data.

¹⁹⁹ See Exhibit 13

²⁰⁰ I exclude negative amounts and extraordinary prices (i.e., observations where tube price is greater than \$5,000). I then group observations by product type, size, aspect ratio, and year, and I identify and remove outliers within each grouping as those observations with (a) price greater than five times the 95th percentile price, or (b) price less than one fifth of the 5th percentile price. I aggregate Chunghwa, Hitachi, and Philips data to the month-product-customer level after removing outliers.

following characteristics: application (monitor or TV), size, and finish (bare or ITC); moreover, each group contains all such CRT models found in the sales data. For example, one group is all models of CRTs in the sales data that are 17" flat ITC. I selected this set of characteristics to describe groups because it is the broadest set of CRT characteristics that is common to the target price data and the sales data. It is important to note that while all CRT models within a group are identical with respect to application, size, and finish, they are different with respect to other characteristics relevant to pricing, such as aspect ratio, the type of shadow mask a CRT has, dot pitch, frequency, and coating.

I calculate the sale prices of each group of CRTs each month by dividing monthly revenue for the group by the monthly number of units sold for the group.²⁰¹ To the extent a group contains "premium" CRTs (such as models with a finer-than-normal dot pitch), the average price of CRTs in the group includes the average price differential for premium characteristics.

(3) Comparison of target prices to sale prices

I compare the resulting average sales price for each group each month to the corresponding cartel target price, to the extent my data contain the corresponding target price.²⁰² I report the percentage by which the actual price exceeded the target price.

Exhibit 14 is a graph of the percentage by which sales prices exceeded cartel target prices plotted against time. Bars below the horizontal axis indicate that the actual prices did not reach the target prices,²⁰³ while the bars above the line show that the sales price was higher than the cartel target price. As noted above, the average sale price for a group of CRTs includes the average price differential for premium CRTs characteristics among models in the group, so the average sale price for a group is above the price of a basic CRT in the group. The cartel target prices are generally for basic models.²⁰⁴ Therefore, when I compare average sales prices to target prices for basic models, I expect the sales prices to be above the target prices, because the average sales prices include the average differential for premium models, while the target prices often do not.

A comparison of cartel target prices to prices actually charged to buyers shows that the cartel was able to charge prices at least 95% as high as the cartel target price 63% of the time. See Exhibit 15. Only 13% of actual prices during the cartel were more than 15% below the cartel's target price.

²⁰¹ As noted in footnote 199, four Defendants produced transaction-level sales data, while Panasonic and Samsung produced data by month. Transactions data contain credits, adjustments, and other noise unrelated to price. When summing revenue over all transactions in a month, this noise is netted out, except for carry-overs at months' end. These carryovers are no more likely to be positive than negative each month. Aggregating the four Defendants' transactions data to months is a reasonable way of putting Defendants' data on a common basis for the price matching analysis described in this section of my report.

²⁰² As I explained in Section VIII.A.3.c)(1), I expect that as discovery, document discovery, and my own work progress, I will identify additional cartel target prices, but that for some cartel target prices, such as those set bilaterally on the phone, evidence may not exist.

²⁰³ This may be evidence of cartel cheating. Note that the existence of some cheating does not mean prices were competitive; see Section VIII.B.2.

²⁰⁴ The cartel set target price differentials for some product differentiators; the differentials we observe are generally positive, which indicates that the target prices are for basic models.

I also examine how Panasonic's and Samsung's actual prices compared to target prices. Unlike other Defendants, these two Defendants included an indication of the shape (round or flat) of their tubes. I therefore look at matching for Panasonic and Samsung when accounting for or not accounting for shape; see Exhibits 16 and 17. I find that the match between actual and target prices is closer when observations include shape as well as the other tube characteristics. For example, when shape is accounted for, over 39% of actual prices are within 5% of the target price. When shape is not accounted for, 34% of actual prices are within 5% of the target prices.

Based on the comparison of actual and target prices, I find that the cartel was generally successful in raising prices towards its target prices.

d) The cartel proclaimed its own success

Independent confirmation of the success of the CRT cartel is found in statements made by the cartel members themselves. Cartel members were, as I have noted, well-placed to know whether the cartel was able to set prices above the non-cartel level, and they expressed their belief on numerous occasions that the cartel succeeded in raising price.²⁰⁵

e) Monitoring capacity indicates capacity was below but-for levels

As I showed above, the cartel caused price to be above the competitive level in part by restricting capacity,²⁰⁶ and when it did so, the cartel monitored compliance with its capacity restrictions. The fact that the cartel devoted resources to monitoring its capacity restrictions is evidence that

²⁰⁵ See, e.g.,

- “The conclusion of the 17" CDT price increase: proceeding smoothly: each maker has increased prices since January 16 [Underlined by hand].” Chunghwa Picture Tubes, LTD, 26 January 1999, Contact Report, CHU00030701 - CHU00030704 at 0702.02E.
- “*Mr. Lin* emphasized that this year the 17" price has been able to be *keep* at a price no less than \$90 because of the *Glass Meeting*.” Chunghwa Picture Tubes, LTD, 13 October 1999, Contact Report, Meeting Topic: CDT Regular Exchange Meeting, CHU00030888 - CHU00030893 at 0889.
- “[P]rice-up trend in European & American market thanks to capacity reduction in Asia”. Chunghwa Picture Tubes, LTD, 27 October 1999, Visitation Report, Topic: Exchange of Market Information and Price Review, CHU00030899 - CHU00030903 at 0902E.
- “Review of the implementation method of the Working Level weekly meeting: Each maker indicated that because of the success of Glass Meeting, everybody has been Enjoying Business this year. Now that the Slow Season is coming, everybody should continue to strengthen communications and contacts, so the weekly meetings should continue to be held on time.” Chunghwa Picture Tubes, LTD, 09 November 1999, Visitation Report, CHU00030916 - CHU00030918 at 0916.02E.
- “14" [Bullet] Price increase completed”. Samsung Display Device, Philips, 20 August 2000, Top Management Meeting (August 20), SDCRT-0086675 - SDCRT-0086681 at 6677E.
- “[T]he price of [15"] CDT's increased”. Samsung Display Device, Philips, 20 August 2000, Top Management Meeting (August 20), SDCRT-0086675 - SDCRT-0086681 at 6677E.
- “All meeting attendees expressed that with the GSM's [Glass Meetings'] efforts to maintain the selling prices in the Southeast Asian region, almost all ended up with break even in 2005”. Chen, Mu-Lin (Jimmy), 09 March 2006, Market Visitation Report (Glass Meeting), CHU00124103 - CHU00124109 at 4107E.

²⁰⁶ See Section VIII.A.2.e) for my discussion of the cartel's restriction of output and capacity.

capacity was below the competitive level, and therefore that price was above the competitive level.

The competitive level of capacity is, for each firm, the capacity that the firm would have chosen absent the cartel. Absent the cartel, each firm would have chosen capacity to maximize its own profit. Self-interest ensures that firms will make profit-maximizing choices without being monitored. If the cartel had set capacity levels at the competitive level, monitoring would not have been necessary. The fact that the cartel devoted resources to monitoring, demonstrates that the capacity set by the cartel was below the level firms would have chosen in a competitive environment. With capacity restricted by the cartel below the competitive level, price must have been above the competitive level.²⁰⁷

B. The cartel's impact on direct purchasers was common

In this section, I show that the cartel impacted all direct purchasers, and that proof of harm to direct purchasers is common to all members of the class. Later, at Section VIII.C and IX, I demonstrate that the impact was passed through to all indirect purchasers, and that the overcharge to direct purchasers and passed through to class members can be calculated by a formula common to class members.

1. The cartel raised the entire price structure

As described above, CRTs are differentiated products, with differentiation in several dimensions, such as size and shape.²⁰⁸ In this section, I show that actual CRT prices exhibit a price structure that corresponds with CRT characteristics: product differentiating characteristics lead to price differentials. For example, larger CRTs have higher prices than smaller CRTs, other characteristics being equal; flat CRTs have higher prices than round CRTs, other characteristics being equal; and so on. I call the relationships between prices for CRTs the price structure. In this section, I show that the cartel raised the entire structure of CRT prices. By this I mean that the cartel caused all CRT prices to rise, just as a rising tide lifts all boats. I show that the cartel's exercise of market power caused all CRT prices to be above the competitive levels. I begin by explaining that the cartel raised the entire structure of CRT prices because rational cartelization requires that the entire structure be raised.

a) Rational cartelization requires that the entire price structure be raised

Substitution between differentiated products is governed by the products' relative prices. For example, if the price of a flat CDT relative to the price of a (otherwise identical) round CDT increases, other things equal, consumers will substitute away from (purchase fewer of) the flat CDTs to (purchase more of) the round CDT. A price structure describes relative prices, and therefore determines substitution between differentiated CRTs.

To operate the cartel rationally requires that the cartel raise the entire price structure, holding relative prices close to the relative prices in a competitive market. To see why this is so, consider the alternative: if the cartel raised the price of 14" CDTs above the competitive level and did not raise the price of the 15" CDTs, the price of 14" CDTs relative to 15" CDTs would rise, causing substitution away from the 14" and to the 15" CDT. If the 15" CDT were not priced supra-

²⁰⁷ See Section V.B.1.a) for an explanation of how restricting output causes price to be supra-competitive.

²⁰⁸ See Section VI.A.2.

substitution away from the 14" and to the 15" CDT. If the 15" CDT were not priced supra-competitively, this substitution would partially defeat the purpose of raising the price of the 14" models. The cartel can avoid such unprofitable substitution by raising the entire price structure, leaving relative prices substantially the same in the actual world as in the but-for world.

b) Raising one price causes neighboring prices without targets to rise

Fixing the price of one CRT can cause the prices of “neighboring models” of CRTs to rise, even without explicitly fixing the price of the neighbors, solely through the effect of market forces. Suppose, for example, that the cartel raised the price of price of round 17" CDTs but did not set a target price for flat 17" CDTs. The price of flat 17" CDTs would fall relative to the price of round 17" CDTs, causing consumers to substitute away from round to flat CDTs, causing the demand curve for flat CDTs to increase, which would cause the market equilibrium price of flat CDTs to rise because the cartel raised the price of the neighboring round 17" CDTs.²⁰⁹ The exercise of market power on one model can therefore be transmitted to the nearest neighbors of that model, and the neighboring models can transmit market power further to their neighbors (19" flat CDTs, for example), causing the prices of those products to rise. Therefore, by establishing a price structure for a subset of CRTs, the cartel can cause the prices of all CRTs to rise, even those for which the cartel did not explicitly set a target price.²¹⁰ In practical terms, the magnitude of the effect is likely to be small on models far removed in product space from the single model whose price was changed (e.g., if the price on 14" CDTs increased by \$5, the impact on the price of 21" CDTs would be smaller). However, by setting a subset of all prices, distributed throughout the product space, the cartel can raise the entire structure.

c) The cartel established a structure in target price

The cartel established a price structure when it set target prices for CRTs. It did so in two fundamental ways, which I describe next.

(1) Establishment of a price structure by setting target price levels

When the cartel set price levels, it set target prices that exhibited a structure. For example, in January 2002, the cartel “confirmed the bottom line pricing that must be kept” for the following CDT products:²¹¹

15"	\$44
17"	\$57
17" RF	\$67
19"	\$82

²⁰⁹ The price of flat 17" CDTs would not increase when demand for the product increased only in the improbable case that sellers would sell up to an infinite amount of flat 17" CDTs regardless of the level of demand.

²¹⁰ The USITC found a similar effect in televisions. The differentiator the Commission was interested in was quality; it found that “there is some degree of brand and perceived quality differentiation in the CTV [CRT TV] market. We do not, however, find that the market is characterized by discrete, rigidly-defined quality tiers. Instead, prices at the low end of the market can affect prices in other portions of the market.” United States International Trade Commission, May 2004, Certain Color Television Receivers from China, USITC Publication 3695, http://www.usitc.gov/publications/701_731/pub3695.pdf, accessed 17 May 2012 at 11, emphasis supplied.

²¹¹ The “RF” refers to a flat CDT. Chunghwa Picture Tubes, LTD, 04 January 2002, Visitation Report, CHU00031176.

These price levels implicitly establish two differentials between neighboring sizes: a \$13 differential for the 17" CDT above the price of the 15" CDT, and \$15 for the 19" CDT above the price of the 17" RF CDT.²¹² It also establishes a price differential of \$10 for the flat 17" CDT above the price of the round model of the same size.

(2) Establishment of a price structure by setting target price differentials

In addition to setting price levels for CRTs (such as \$44 for 15" CDT in the example above), the cartel fixed prices by another mechanism: setting price *differentials*. A price differential is a price increment associated with a product differentiator, such as an addition \$15 for a flat CDT above the price of the round CDT. Setting price differentials for product differentiators is a simple way to impose a structure on cartel prices. For example,

- Size: The cartel set a target price for 15" CDTs at \$15 above the price of 14" CDTs.²¹³
- Shape: The cartel fixed the price of 17" flat CDTs to be \$14 above the price of 17" round CDTs.²¹⁴
- Resolution: The cartel agreed to set a \$5 premium for a finer-than-normal dot pitch on 19" CDTs.²¹⁵
- ITC: The cartel agreed to set the price for 20" ITC CPTs \$4 above the price of 20" bare CPTs.²¹⁶

By setting target price differentials in several dimensions, the cartel created a structure that pervades the cartel's target prices. Setting just a few price differentials automatically creates a considerable amount of structure on prices. For example, the simple agreement that "[t]he price differentials for Coating, Frequency, and Dot Pitch will be, respectively, USD 3/pc, USD 2/pc,

²¹² One could also examine the price differential for non-neighboring sizes; there is a \$38 differential for the 19" CDT relative to the 15" CDT.

²¹³ Among the "Conclusion[s]" of a cartel meeting was "SSDD [Samsung Display Devices, which is what Samsung SDI was called until 1999] has requested that all makers propose to their headquarters that the scale of price increase of the 15" be a bit larger, and that a price differential of at least US\$15 should be maintained from 14"." Chunghwa Picture Tubes, LTD, 09 October 1998, Mainland China CDT Maker Contact Meeting, CHU00030679 - CHU00030683 at 0682.01E.

²¹⁴ "Each maker agreed to change the price differential between 17" regular [round] and flat tubes to \$14." Chunghwa Picture Tubes, LTD, 19 March 2001, Visitation Report (Submit), CHU00031111 - CHU00031112 at 1112.01E.

²¹⁵ "Following a lengthy discussion, it was resolved on a new bottom price of USD 160 for 0.26mm/TCO and set the price difference between TCO/95 KHZ/0.26 mm and MPRII/85 KHZ/O.28mm at USD 10/pc. The price differentials for Coating, Frequency, and Dot Pitch will be, respectively, USD 3/pc, USD 2/pc, and USD 5/pc." Chunghwa Picture Tubes, LTD, 23 July 1999, Visitation Report, Topic: CDT Market Information Exchange and Price/Production Volume Review, CHU00030809 - CHU00030814 at 0810.01E, emphasis in original.

²¹⁶ Samsung, LG, Orion, Thai CRT, and Philips decided to set the 14" ITC price \$3 higher than the 14" Bare price. Also, these manufacturers decided to set the price for 20" ITC CPTs \$4 higher than the price of 20" Bare CPTs. Chunghwa Picture Tubes, LTD, 07 March 2000, Visitation Report (Submit), CHU00029147 - CHU00029151 at 149E - 9150.01E.

and USD 5/pc”²¹⁷ creates, for each standard product, target prices for seven additional premium (better-than-standard) products. Among all eight products there are 28 relative prices.²¹⁸ This automatically creates a great deal of structure. Exhibit 18 is a list of price differentials set by the cartel that contributed to the structure of cartel target prices.

d) Cartel target prices exhibit a structure

In this section, I analyze the cartel’s target prices, and present empirical evidence that the target prices set by the cartel can be closely approximated by a function of product characteristics. Models of price as a function of product characteristics are called “hedonic”.²¹⁹ I present this evidence to show that the cartel imposed a structure on target prices in which products with differentiators received target price differentials.

I test for the presence of a structure in cartel target prices by evaluating how well cartel target prices can be approximated by a function of CRT characteristics. I estimate the hedonic equation using linear regression. If cartel target prices fit the model well, the hedonic regression will show that a price structure exists. A measure of the goodness of fit of the regression is the R-squared, denoted R^2 : if the R^2 is close to 1, then product prices are largely determined by product characteristics in a formulaic way. The R^2 gives the percentage of the variation in the dependent variable that is explained by the regression.²²⁰ In that case, there is a price structure and, at any given time, cartel target prices are determined largely by product characteristics, and whether the buyer was a major customer.²²¹

I estimated two hedonic regressions, one for CPTs and one for CDTs. The regression I estimated for CPTs is

$$\log(\text{Price}_i) = \beta_0 + \beta_1 \text{ITC}_i + \beta_2 \text{Flat}_i + \lambda \text{Size}_i + \beta_3 \text{Major}_i + \gamma_1 \text{Time}_i + \gamma_2 \text{Time}_i^2 + \varepsilon_i,$$

where ITC_i is an indicator variable equal to one if target price i is for a CPT sold “ITC” rather than “bare”; Flat_i is an indicator variable equal to one if target price i is for a flat-screen CPT; Size_i is a vector of indicator variables for different screen sizes; Major_i is an indicator variable equal to one if target price i is for a major customer and equal to zero otherwise; and Time is

²¹⁷ Chunghwa Picture Tubes, LTD, 23 July 1999, Visitation Report, Topic: CDT Market Information Exchange and Price/Production Volume Review, CHU00030809 - CHU00030814 at 10.01E.

²¹⁸ For example, if a standard 19" CDT is priced at \$160, the differentials specified above create prices for the following seven products: 19" CDT with premium coating; 19" CDT with premium frequency; 19" CDT with premium dot pitch; 19" CDT with premium coating and frequency; 19" CDT with premium coating and dot pitch; 19" CDT with premium frequency and dot pitch; and 19" CDT with premium coating, frequency and dot pitch. Among these eight products (the standard version and seven differentiated products) there are 28 pairs of prices, with a relative price associated with each pair.

²¹⁹ Hedonic models are widely used by economists interested in the correlation between the price of goods and the features or qualities they possess. For a survey of the recent literature on hedonic price models and an application to PDAs, see Chwelos, Paul D., Ernst R. Berndt, and Iain M. Cockburn, November 2008, Faster, Smaller, Cheaper: An Hedonic Price Analysis of PDAs, Applied Economics, Vol. 40(2), 2839-2856.

²²⁰ Woolridge, Jeffrey M., 2000, Introductory Econometrics: A Modern Approach, South-Western College Publishing: Mason at 40.

²²¹ Major customers are Aiwa, Funai, Orion, SREC, TCE, Samtel, Ekranas, Philips, Toshiba, IRICO, and BMCC. These are large customers for whom the cartel frequently established individualized prices.

time.²²² In the equation above, at any given time, prices charged to major customers are determined entirely by a product characteristics: size, shape, and whether a CPT is sold ITC; prices charged non-major customers are determined the same way, but can differ from prices charged major customers by some percentage common to all CPTs.

The results of the hedonic regression for CPTs are in Exhibit 19. To illustrate how to read the results of the regression, the estimated target price premium for CPTs sold ITC above the price of those sold bare is about 11%, and the target price premium for flat CPTs above round CPTs is about 20%.

The regression as a whole is highly statistically significant, and the R^2 for this regression is .98. In other words, the product characteristics, time trends, and whether the direct purchaser was considered a major customer by the cartel explain 98% of the variance of the log of CRT price. By adjusting the R^2 , I find that the product characteristics, time trends, and whether the direct purchaser was considered a major customer by the cartel explain 98% of the variance of the CRT price itself, rather than its logarithm.^{223,224}

The regression I estimated for CDT target prices is

$$\log(\text{Price}_i) = \beta_0 + \beta_1 \text{Flat}_i + \lambda \text{Size}_i + \beta_2 \text{Major}_i + \gamma_1 \text{Time}_i + \gamma_2 \text{Time}_i^2 + \varepsilon_i.$$

The variables are defined as above.²²⁵

The results of the hedonic regression for CDTs are in Exhibit 20. This regression, like the CPT target price regression, is highly significant, with an R^2 of 91%. Adjusting the R^2 , I find that 91% of the variation in cartel target prices is explained by product characteristics, time trends, and whether the direct purchasers is considered a major customer by the cartel.²²⁶

I concluded in the previous section that when the cartel fixed prices by setting differentials, it established a structure in its target prices. In the hedonic regressions, I analyze all of the cartel target prices I have found to date, those created by setting price levels as well as those created by setting price differentials, and conclude that a price structure exists in the cartel's target prices.

e) Defendants' sale prices exhibit a price structure

In this section, I analyze the prices Defendants charged their customers using hedonic regression to determine the extent to which the prices Defendants charged to direct purchasers can be closely approximated by a formula common to all direct purchasers. I also decompose the

²²² I include a time trend in the hedonic regression in order to estimate the effect of the other variables (such as size and shape) while controlling for the effect of regular changes over time.

²²³ I calculate the percentage of variation in price using the Duan smearing estimator. For a description of the Duan Smearing estimator, see Duan, Naihua, September 1983, Smearing Estimate: A Nonparametric Retransformation Method, Journal of the American Statistical Association, Vol. 78. No. 383, 605-610.

²²⁴ These results show that measuring the proportion of the variation of price and the logarithm in price give very similar results.

²²⁵ I do not include a variable indicating the finish (ITC or bare) because the target prices for CDTs generally does not include that information.

²²⁶ I calculate the percentage of variation in price using the Duan smearing estimator. For a description of the Duan Smearing estimator, see Duan, Naihua, September 1983, Smearing Estimate: A Nonparametric Retransformation Method, Journal of the American Statistical Association, Vol. 78. No. 383, 605-610.

variance in sales prices explained by three categories of variables: the variance attributable to product characteristics and time, the variance attributable to buyer-seller pairs, and the variance left unexplained. Based on the results, I conclude that the majority of the variance in prices paid by direct purchasers is attributable to the common factors of product characteristics and a time trend.

The Defendant sales data I used for this analysis are described in Section VIII.A.3.c)(2). Briefly, the Defendant sales data identify the seller, the buyer, sales revenue, and quantity sold, by a large number of CRT models. Four Defendants produced transaction-level data and two Defendants produced monthly data, with no transaction-level detail. I cleaned the data as described in footnote 200. I aggregated the transaction-level data across transactions within a month to reduce the noise due to returns and credits, as explained in footnote 201. For the analysis described here, I did not aggregate sales data across “groups” of models, as I did when I compared sale prices to cartel target prices in Section VIII.A.3.c).

I estimated a hedonic regression of price as a function of product characteristics, a time trend, and indicator variables for buyer-seller pairs using linear regression. Mathematically, the regression I estimated is

$$\log(\text{Price}_{ijt}) = \beta_0 + \beta_1 \text{Char}_i + \beta_2 \text{SB}_j + \gamma_1 \text{Time}_t + \gamma_2 \text{Time}_t^2 + \varepsilon_{ijt},$$

where Price_{ijt} is the price charged for CRT model i between seller-buyer pair j at time t ; Char_i is a vector of indicator variables for product characteristics, including aspect ratio (wide or not), size, and finish (bare or ITC) of CRT model i ; SB_j is an indicator variable for seller-buyer pair j ; ²²⁷ and the time variables allow for a trending influence on price. ²²⁸ I fit the model separately for CDTs and CPTs. The results of the regressions are presented in Exhibits 21 and 22.

Both regressions are highly significant. The R^2 of the CDT regression is 0.92, which means that 92% of the variation in the logarithm of price for CDTs can be explained by product characteristics, buyer-seller pairs, and a time trend. The R^2 of the CPT regression is 0.96, which means that 96 of the variation in the logarithm of price for CPTs can be explained by product characteristics, buyer-seller pairs, and a time trend. ²²⁹

The proportion of variation in the logarithm of price that is explained by the hedonic model, R^2 , can be decomposed into the proportion of variation explained by each individual independent (right-hand side) variable or a subset of the independent variables. ²³⁰ I decompose the explained variation into the proportion explained by the product characteristics and time trend, R_{CT}^2 , and the

²²⁷ Seller-buyer pairs are identified by customer names in each defendant dataset. Alternate spellings of a single customer name within a given defendant dataset results in separate seller-buyer pairs for each spelling variation.

²²⁸ For notational ease, in this representation β_1 and β_2 represent sets of coefficients. The set of β_1 coefficients includes coefficients for each level of product characteristic observed in the data. For example, there is a coefficient for each size of CRT. Similarly, the set of β_2 coefficients includes a coefficient for each seller-buyer pair.

²²⁹ To allow for the measurement of the explanatory power of variables groups (described in the following paragraph), I examine the variance in the logarithm of price. The variation in price and the logarithm of price are very close; see footnote 224.

²³⁰ Fields, Gary S., March 2004, Regression-Based Decompositions: A New Tool for Managerial Decision-Making, Cornell University, Department of Labor Economics, http://www.ilr.cornell.edu/directory/downloads/fields/Author_decomposingRegressions_mar04.pdf, accessed 21 September 2012.

proportion explained by the buyer-seller pairs, R_{SB}^2 . That is, the proportion of the total variation in the logarithm of price that is explained by the regression is $R^2 = R_{CT}^2 + R_{SB}^2$, and the proportion of unexplained variation is simply $1 - R^2$.

These results demonstrate that over 71% and slightly less than 89% of the variation in the logarithm of CDT and CPT tubes, respectively, is explained by product characteristics and time. The proportion explained by buyer-seller pairs is 21% and 8 % of CDTs and CPTs, respectively. Only 8% and 4% of the variance in the logarithm of price is not explained by the hedonic regression.

Only two of the six sets of sales data produced by Defendants contain information about CRTs' shape, which is a characteristic relevant to pricing. To gauge the effect shape would have on the decomposition of variance described above, I re-estimated the hedonic regression of sales prices using the sales data from Panasonic and Samsung, which include information about shape, including and excluding shape. I perform the decomposition of variance described above in the regression with and without shape included as regressors. By estimating two regressions that use the same data and are the same except for the inclusion of shape as a regressor, I am able to assess the effect of shape on the decomposition of variance. The regression results are in Exhibits 23 and 24.

I find that the regressions that include shape as a regressor explain a negligibly higher proportion of the variance of the logarithm of price; the R^2 increases from 0.9435 to 0.9436 for CDTs and from 0.9637 to 0.9708 for CPTs. The decomposition of variation explained by product characteristics and time trends is nearly the same for CDTs. For CPTs, including the shape variable slightly increases the proportion of the variance in the logarithm of price that is explained by product characteristics and time trends (from 0.90 to 0.93) and slightly decreases the proportion explained by buyer-seller pairs (from 0.07 to 0.04).

The conclusion is clear. If transaction prices were driven primarily by individual factors such as the nature of the class member or the outcome of a specific negotiating procedure between each Defendant and each direct purchaser, then I would not find a common pricing structure determined by common CRT characteristics that would explain a majority of the variation in prices. The hedonic regressions on sales prices show that there is a common pricing structure; CRT prices are largely determined by a formula based on the characteristics of the product and the period in which the transaction took place. The results of the hedonic analysis clearly indicate that common factors overwhelm the individual factors in determining CRT prices. The implication is that prices respond similarly to common market forces and therefore the target price structure the cartel put in place had the effect of causing the prices of all CRTs to be above the competitive level, not merely the CRTs whose prices were fixed by the cartel. I conclude that proof of harm does not require individualized inquiry into the effect of the cartel's conduct on any particular product or buyer; it is common to all class members.

2. Even cheaters' prices are above competitive prices

Cartel cheaters, by definition, charge prices below the cartel target price; this is a form of price competition. But, if cheating is not ubiquitous, cheating is a limited form of competition that yields supra-competitive prices. This is because the cartel members that cooperate with cartel policy provide a price umbrella: buyers must pay the supra-competitive cartel target price if they do not buy from cheaters, so cheaters can sell at prices below the cartel target price but still above the competitive level. More formally, the proof by which I showed that exercise of market

power is transmitted throughout the price structure²³¹ can be adapted to apply here. Products offered by cheaters are substitutes for products offered by non-cheating cartel members. When non-cheating cartel members set prices above the competitive level, the cartel causes demand for substitute CRTs offered by cheaters to shift out, raising buyers' willingness to pay for cheaters' CRTs. Cheaters can therefore charge supra-competitive prices for CRTs that are substitutes for CRTs priced at cartel target levels.

3. Cartelizing conduct impacts the entire industry

The operating practices of the cartel (described in Section VIII.A.2) are a mutually-reinforcing complex of behaviors that, taken together, determine the overall effectiveness of the cartel at raising all CRT prices. For example,

- cartel members shared general information about capacity, output, prices, and plans;
- the cartel divided the market;
- the cartel established a hierarchy, with some meetings attended by top executives, and some working-level meetings;
- the formation of the cartel itself created market power that could be exercised on any CRT.

The entire complex of cartelizing conduct, taken together, enabled the CRT cartel to exercise market power on all CRTs, impacting all class members in common.

C. The cartel's increased price to direct purchasers was passed through to indirect purchasers

Above I showed that the impact of the cartel was to raise price to direct customers; that is, direct customers were harmed by the cartel by facing higher prices for CRTs. In order for class members to have been harmed by the cartel by facing higher prices for CRT products, at least some portion of the overcharge imposed on direct purchasers must have been passed down the distribution chain.

In order to address this question, I first review the economic theory of pass-through, which consistently predicts that industry-wide cost increases result in price increases; that is, economic theory shows that pass-through is positive. Next, I present documentary evidence showing that Defendants expected resellers of CRT products to pass through cost changes. These documents also establish that Defendants routinely monitored the street, or retail, prices of CRT products. Street price monitoring underscores that Defendants are aware of the connection between the price charged to direct purchasers and the amount paid by class members. My review of these materials leads me to conclude that, based on common methods and evidence, at least some portion of the cartel overcharge was passed through to class members. In other words, class members were harmed by the cartel.

1. Economic theory shows that pass-through of overcharges is positive

Economists routinely study the impact of changes in costs (in this case, a change in the cost of a CRT) on prices (in this case, the price of a product containing a CRT). Economists refer to the

²³¹ See Section VIII.B.1.c).

concept of upstream costs leading to changes in downstream prices as “pass-through” (also sometimes called “pass-on”). The pass-through rate quantifies the degree to which output prices change when costs change.^{232,233} For example, a pass-through rate of 110% means that when costs increase by \$1, prices increase by \$1.10.

Pass-through can occur at each stage of the manufacturing and distribution process. For example, consider the market for gasoline. An increase in the price of crude oil can cause an increase in the price of wholesale gasoline, which can cause an increase in the rack price of gasoline paid by gas stations, which, in turn, can cause an increase in the retail price of gasoline. Indeed, studies on this issue have shown that changes in the cost of crude oil (at the top of the distribution channel) are passed-through to consumers of gasoline (at the bottom of the distribution channel).²³⁴

²³² E.g., if a \$50 increase in costs causes prices to increase by \$55, then the pass-through rate is 110% ($\$50 \times 110\% = \55). Mathematically, the pass-through rate is the partial derivative $\partial p / \partial c$, where p represents price and c represents cost.

²³³ There is another relationship between cost and price that is sometimes confused with pass-through. This is a term called mark-up. The mark-up rate refers to the average relationship between cost levels and price levels. It is calculated as total price divided by total cost. While the mark-up rate is a relationship between price and cost levels, the pass-through rate refers to the relationship between cost and price changes.

²³⁴ See, e.g.,

- Asplund, Marcus, Eriksson, Rickard, et al., 2000, Price Adjustments by a Gasoline Retail Chain, *Scandinavian Journal of Economics*, Vol. 102(1), pp. 101-121.
- Bachmeier, Lance J., and James M. Griffin, 2003, New Evidence on Asymmetric Gasoline Price Responses, *The Review of Economics and Statistics*, Vol. 85(3), pp. 772-776.
- Balke, N.S., Brown, S.P.A., and M.K. Yucel, 1998, Crude Oil and Gasoline Prices: An Asymmetric Relationship?, *Federal Reserve Bank of Dallas Economic Review*, pp. 2-11.
- Burdette, Michael, and John Zyren, January 2003, Gasoline Price Pass-through, Energy Information Administration, http://www.eia.doe.gov/pub/oil_gas/petroleum/feature_articles/2003/gasolinepass/gasolinepass.htm, accessed 26 July 2005.
- Duffy-Denno, K.T., 1996, Retail Price Asymmetries in Gasoline Local Markets, *Energy Economics*, Vol. 18, pp. 81-92.
- Energy Information Administration, November 2003, 2003 California Gasoline Price Study Final Report, Department of Energy.
- Godby, R., Linter, A.M., et al., 2000, Testing for Asymmetric Price Responses in the Canadian Gasoline Market, *Energy Economic*, Vol. 22, pp. 349-368.
- Kirchgassner, Gebhard, and Knut Kubler, 1992, Symmetric or Asymmetric Price Adjustments, *Energy Economics*, Vol. 14, pp. 171-185.
- Reilly, B., and R. Witt, 1998, Petrol Price Asymmetries Revisited, *Energy Economics*, Vol. 18, pp. 297-308.
- Shin, David, December 1992, Do Product Prices Respond Symmetrically to Changes in Crude Prices?, American Petroleum Institute, Research Study #068, pp. 137-157.
- Weinhausen, Jonathan, July 2003, Consumer Gasoline Prices: An Empirical Investigation, *Monthly Labor Review*, Vol. 126(7), pp. 3-10.

A fundamental result in economics is that firms increase price when faced with an increase in cost in most situations. The incentives to increase price in response to a cost increase are particularly strong when the following conditions are true: the cost increase affects all firms without changing their relative competitive position, and the cost increase is perceived to be non-transitory. This pass through occurs regardless of the market structure of the industry facing the cost increase; that is, economic theory shows that an industry-wide, non-transitory cost increase leads to an increase in price whether the industry is monopolistic, oligopolistic, or competitive. While the magnitude of pass-through differs depending on the market structure and the shape of demand for the product, pass-through is positive.²³⁵ Put in the context of this case, economic theory predicts that CRT product prices (i.e., the amount class members pay) increase when CRT prices (i.e., the amount direct purchasers pay) increase.

a) Pass-through is positive in both perfectly competitive and imperfectly competitive markets

In a perfectly competitive market,²³⁶ economic profits are zero in the long-run.²³⁷ If economic profits were negative, firms would exit, causing prices to rise, until economic profits returned to zero; on the other hand, if economic profits were positive, firms would enter, causing prices to decline, until profits returned to zero. If a perfectly competitive firm faced a cost increase that also impacted its competitors, but did not pass through the higher input costs, the firm would earn negative economic profits and would eventually go out of business. In other words, not passing through cost increases would mean the firm would lose money on each unit sold, which is simply not a rational long-term strategy for a profit-maximizing firm.²³⁸ Now suppose that the perfectly competitive market also displays an economic characteristic known as “constant costs”, which means the market can grow to any size without driving up the costs of its inputs.²³⁹ In this case, the long-run pass-through rate of an industry-wide cost increase is 100%, which means that if costs rise by \$1, prices also rise by \$1. Economic theory establishes that when an industry is

²³⁵ Furthermore, I am aware of no empirical study that contradicts the theoretical findings. That is, I am aware of no study published in a peer-reviewed journal that has found a pass-through rate of zero.

²³⁶ A perfectly competitive market is one in which there are many buyers and sellers, none of which can affect prices in any significant manner; there is a homogeneous good; there is perfect information; and there is free entry and exit. Agriculture markets are often considered nearly perfectly competitive. In the market for wheat, for example, there are thousands of sellers (farmers producing wheat) and thousands of buyers who produce flour and other products. In the wheat market, no individual seller or buyer can significantly affect the price of wheat. Pindyck, Robert S., and Daniel L. Rubinfeld, 2005, *Microeconomics: Sixth Edition*, Prentice Hall: Upper Saddle River.

²³⁷ A firm’s profitability can be measured using either accounting profit or economic profit. Accounting profit is a firm’s revenues minus the total costs of producing goods or services including labor, raw materials, and interest plus depreciation expenses. Economic profit is a firm’s total revenue minus the total opportunity cost of the inputs. Therefore, economic profits, unlike accounting profits, consider the return a firm would earn if its capital were used elsewhere. Pindyck, Robert S., and Daniel L. Rubinfeld, 2005, *Microeconomics: Sixth Edition*, Prentice Hall: Upper Saddle River, p. 283.

²³⁸ Firms may elect to temporarily sell products below cost. See Section VIII.C.4 for a discussion of why these pricing aberrations are not inconsistent with positive pass-through.

²³⁹ For example, if unskilled labor is a major input in a firm’s production, and the wage for unskilled laborers is unaffected by the increase in demand, then the firm can expand without incurring any cost increases. A practical example is if a new retail store opens in a large city, the new entrant pays the same wage as existing retail stores—the prevailing wage for store clerks remains unchanged.

perfectly competitive, the pass-through rate of an industry-wide cost increase is positive;²⁴⁰ and, when the industry displays constant costs, the pass-through rate is 100%.²⁴¹

Few markets, if any, fit the textbook definition of perfectly competitive; however, pass-through rate of industry-wide cost changes is positive regardless of the degree of competition. To see this, consider the other extreme from perfect competition: a perfect monopoly where there is only a single seller in the market. A monopolist also will increase its price when its costs increase.²⁴² Most markets are not a perfect monopoly nor are they perfectly competitive; rather they are located between these two extreme market structures. These more common markets are referred to as imperfectly competitive markets. With imperfect competition, the pass-through rate will also be positive. An imperfectly competitive firm recognizes that, when it shifts even a portion of its cost increase forward, the increase in price causes demand for its product to decline. Depending on how responsive demand is to changes in price, an imperfectly competitive firm may find it profitable to shift forward less or more than its cost increase; that is, the pass-through rate may be less than or greater than 100%, respectively.^{243,244} In any event, when an

²⁴⁰ See, e.g.,

- Bishop, Robert L., May 1968, The Effects of Specific and Ad Valorem Taxes, *Quarterly Journal of Economics*, Vol. 82(2), pp. 198-218.
- Kosicki, George, and Miles B. Cahill, Fall 2006, Economics of Cost Pass Through and Damages in Indirect Purchaser Antitrust Cases, *Antitrust Bulletin*, Vol. 51(3), pp. 599-630.

Pass-through is zero under perfect competition in the unrealistic case where demand is perfectly elastic; that is, in cases where demand falls to zero if price increases at all.

²⁴¹ Nicholson, Walter, 2005, *Microeconomic Theory: Basic Principles and Extensions*: Ninth Edition, South-Western: Mason, Ohio, pp. 296-299 and Stiglitz, Joseph E., May 1988, *Economics of the Public Sector*, 2nd edition, W.W. Norton & Company, p.417.

²⁴² See, e.g.,

- Bishop, Robert L., May 1968, The Effects of Specific and Ad Valorem Taxes, *Quarterly Journal of Economics*, Vol. 82(2), pp. 198-218.
- Bulow, Jeremy I., and Paul Pfleiderer, February 1983, A Note on the Effect of Cost Changes on Prices, *The Journal of Political Economy*, Vol. 91(1), pp. 182-185.

²⁴³ When a firm increases its price in response to a cost increase, there are two effects on profits: (1) the firm's profit on each unit sold changes and (2) the firm sells fewer units. While the second effect always causes the firm's profits to fall, the first effect may cause, by itself, the firm's profit to rise or fall. In either case, the firm's profits fall when costs increase, but the firm mitigates the extent of the profit decline by increasing its price.

Suppose that a firm passes through less than 100% of a cost increase. In that case, its profit on each unit sold declines and it sells fewer units. The loss in sales is smaller than it would be if the firm passed on 100% or more of a cost increase. When the firm is earning economic profits, the firm can account for the higher costs in part by passing some of the cost increase on to consumers and in part by reducing its profit margin. If a firm passes through more than 100% of a cost increase, then it still sells fewer units, but its profit on each unit sold increases. The increase in profits per unit may mitigate the decline in profits caused by the decline in volume sold. The pass-through rate is less than 100% when the change in price reduces quantity sufficiently that it would offset the increase in profits per unit if price rose by more than the cost change. Fullerton, Don and Gilbert E. Metcalf, 2002, Chapter 26: Tax Incidence, in Auerback, A.J. and M. Felstein (Eds.), *Handbook of Public Economics*, Vol. 4, Elsevier Science: Amsterdam, p. 1825.

²⁴⁴ See, e.g.,

industry is imperfectly competitive, the pass-through rate of an industry-wide, non-transitory cost increase is positive,²⁴⁵ although the pass-through rate may be greater than or less than 100%.²⁴⁶

b) Pass-through can be calculated when there are multiple levels of distribution

Pass-through occurs at each stage of the manufacturing and distribution process. For example, suppose there are several stages in the distribution chain: a manufacturer sells to a distributor, the distributor sells to a retailer, and the retailer sells to the end consumer. When the manufacturer faces an industry-wide, non-transitory increase in the cost of inputs, it increases its price. Similarly, when the distributor (and all its competitors) pays a higher price for the product, it also increases its price; this process continues throughout the entire distribution chain. The pass-through rate from the top of the distribution channel to the bottom of the distribution channel, or

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- Anderson, Simon P., de Palma, Andre, and Brent Kreider, 2001, Tax Incidence in Differentiated Product Oligopoly, *Journal of Public Economics*, Vol. 81, pp. 173-192.
 - Besley, Timothy, 1989, Commodity Taxation and Imperfect Competition: A Note on the Effects of Entry, *Journal of Public Economics*, Vol. 40, pp. 359-367.
 - Delipalla, Sophia, and Owen O'Donnell, 2001, Estimating Tax Incidence, Market Power and Market Conduct: The European Cigarette Industry, *International Journal of Industrial Organization*, Vol. 19, pp. 885-908.
 - Karp, Larry S., and Jeffrey M. Perloff, 1989, Estimating Market Structure and Tax Incidence: The Japanese Television Market, *Journal of Industrial Economics*, Vol. 37(3), 225-239.

²⁴⁵ Bulow and Pfleiderer show this result for a monopoly. Bulow, Jeremy I., and Paul Pfleiderer, February 1983, A Note on the Effect of Cost Changes on Prices, *The Journal of Political Economy*, Vol. 91(1), 182-185. Fullerton and Metcalf show this result for oligopolies. Fullerton, Don, and Gilbert E. Metcalf, 2002, Chapter 26: Tax Incidence, in Auerback, A.J., and M. Felstein (Eds.), *Handbook of Public Economics*, Vol. 4, Elsevier Science: Amsterdam, p. 1823.

²⁴⁶ Empirical studies have found pass-through rates of less than, greater than, and equal to 100%. For estimates of pass-through rates less than 100%, see, e.g.,

- Balke, N.S., Brown, S.P.A., and M.K. Yucel, 1998, Crude Oil and Gasoline Prices: An Asymmetric Relationship?, *Economic Review*.
- Duffy-Deno, K.T., 1996, Retail Price Asymmetries in Gasoline Local Markets, *Energy Economics*, Vol. 18.

For estimates of pass-through rates greater than 100%, see, e.g.,

- Doyle, Maura P., July 1997, The Effects of Interest Rates and Taxes on New Car Prices, Board of Governors of the Federal Reserve System Finance and Economics Discussion Series 1997-38.
- Karp, Larry S., and Jeffrey M. Perloff, 1989, Estimating Market Structure and Tax Incidence: The Japanese Television Market, *Journal of Industrial Economics*, Vol. 37(3), 225-239.

For estimates of pass-through rates equal to 100%, see, e.g.,

- Bacon, R.W., 1991, Rockets and Feathers: the Asymmetric Speed of Adjustment of UK Retail Gasoline Prices to Cost Changes, *Energy Economics*, Vol. 13.
- Karp, Larry S., and Jeffrey M. Perloff, 1989, Estimating Market Structure and Tax Incidence: The Japanese Television Market, *Journal of Industrial Economics*, Vol. 37(3), 225-239.

the “channel-length” pass-through rate, is the product of the pass-through rates for each distribution level.

For example, consider an example where Samsung (SDI), a CRT manufacturer, sells CRTs to BenQ, a company that makes CRT monitors using those same tubes, for \$100. BenQ then sells those CRT monitors to Best Buy, a retailer, for \$115. Best Buy then sells the monitors to end-users for \$120. Now suppose that SDI increases the price it charges BenQ by 10%, resulting in a tube price of \$110. Suppose that BenQ in turn increases its price to \$130 and that Best Buy increases its price to \$135. The pass-through rate for BenQ is 150%²⁴⁷ and the pass-through rate for Best Buy is 100%.²⁴⁸ Therefore, the channel-length rate is 150%, which is the product of the two pass-through rates, $150\% \times 100\% = 150\%$.

One can also measure the impact of the cost increase imposed by SDI on the price paid by final consumers in a single step. Using the same numerical example above, the channel-length pass-through rate can be calculated directly: the change in price to the end user is \$15 and the cost increase at the top of the channel is \$10;²⁴⁹ therefore, the channel-length pass-through rate is again 150%, which is \$15 divided by \$10. Thus, it is not necessary to estimate BenQ’s and Best Buy’s pass-through rates in order to determine the pass-through rate for a price increase imposed on direct purchasers on to the price that final consumers pay.

The channel-length pass-through rate calculation gives them same result whether it is calculated stage-by-stage or in a single step.

c) The more competitive the industry, the closer the pass-through rate is to 100%

Suppose that an industry is imperfectly competitive, in which case I know the pass-through rate is not equal to 100%, although it could be either above or below 100%. Regardless of whether it was initially above or below 100%, I know that as the degree of competition in the industry increases, the pass-through rate approaches 100%. At the extreme, when the industry achieves perfect competition (and costs are constant), the pass-through rate reaches 100%. The more competitive an industry, the closer the pass-through rate is to 100%.²⁵⁰

d) The distribution channel is highly competitive

²⁴⁷ Calculated as the change in price (\$130 – \$115) divided by the change in cost (\$110 – \$100).

²⁴⁸ Calculated as the change in price (\$135 – \$120) divided by the change in cost (\$130 – \$115).

²⁴⁹ The end consumer price for the CRT monitor increased from \$115 to \$130. Direct purchasers buy tubes which are used to make CRT products; the tube costs increased from \$100 to \$110.

²⁵⁰ See, e.g.,

- Benigno, Pierpaolo, and Ester Faia, March 2010, Globalization, Pass-Through and Inflation Dynamic, NBER Working Paper 15842, <http://www.nber.org/papers/w15842>.
- Verboven, Frank, and Theon vanDuk, September 2009, Cartel Damages Claims and the Passing-On Defense, *The Journal of Industrial Economics*, Vol. 57(3), pp. 457-491.
- Werden, Gregory J., Luke M. Froeb, and Steven Tschantz, October 2005, The Effects of Merger Efficiencies on Consumers of Differentiated Products, *European Competition Journal*, Vol. 1(2), pp. 245-264.

As described above (see Section VI.D and Exhibit 11), there are multiple steps in the distribution of CRTs to class members. As each of these levels becomes more competitive, the pass-through rate at each level approaches 100% and, therefore, the channel-length pass-through rate also approaches 100%. The documentary evidence, from a variety of sources, indicates that each of the distribution levels for monitors and TVs is highly competitive.²⁵¹

There are a large number of firms involved in the production and the distribution of CRT products, which is one indicator of intense competition. There are at least 28 brands of CRT monitors, and at least 29 brands of CRT TVs.²⁵² Exhibits 25-26 present market shares for each of the monitor and TV brands.

Intense competition is also evidenced by the lack of concentration among the sellers of CRT products. As explained in Section VI.C.1 above, HHIs are used to measure the degree of concentration. Lower HHI values indicate a less concentrated market and, hence, more competitive conditions for market participants. I calculate HHIs, reported in parentheses, for monitor brands (1120) and TV brands (971),²⁵³ these HHIs fall into the “unconcentrated” category based on the DOJ guidelines.

Intense competition also leads to low profit rates, which is also a characteristic of the production and distribution of CRT products. See Exhibit 27.

The trade press reports a high degree of competition in the production, distribution, and sales of CRT products. The firms that produce and distribute CRT products routinely report intense competition. CRT manufacturers also recognize intense competition throughout the entire distribution channel. See Exhibit 28.

2. Documentary evidence shows that market participants recognize that CRT price changes are passed through

The documentary evidence in this matter is consistent with the economic theory discussed above. Specifically, Defendants and other market participants explicitly and implicitly acknowledge that manufacturers and resellers of CRT products pass-through cost changes to their customers throughout the entire distribution channel.

- Defendants indicate that pass-through of tube prices to product prices occurs. See Exhibit 29.

²⁵¹ That the CRT product manufacturing industry is highly competitive is not inconsistent with Plaintiffs’ claims that Defendants fixed the price of CRTs and CRT products. By fixing the price of CRTs, the Defendants in effect are fixing the price of products, because product prices are a function of CRT prices; an increase in the price of CRTs leads to an increase in the price of CRT products, as discussed in Section VIII.C.1.

²⁵² These numbers are a lower bound because the data contain an “other” category that includes more, smaller, brands.

²⁵³ Market shares and HHIs are calculated using worldwide quantities sold of TVs for 2005-2006 and monitors for 2004-2006. See, e.g.,

- DisplaySearch, 2007, Quarterly Desktop Monitor Shipment and Forecast Report, CHU00154421.
- DisplaySearch, 2007, DisplaySearch Q2’07 Quarterly Global TV Shipment and Forecast Report, SEAI-CRT-00223186.

- Industry participants, including CRT product makers, market research firms, and the trade press, indicate that pass-through occurs. See Exhibit 30.
- The tie between CRT prices and CRT product prices is also reflected by CRT makers following CRT product “street prices”, which are the prices for CRT products paid by end-users; following street prices reveals that the Defendants recognize the tie between tubes and product prices. See Exhibit 31.
- Market research firms, which provide data that Defendants claim to rely upon, regularly publish street prices.²⁵⁴ See Exhibit 32.

All in all, there is ample documentary evidence, from a variety of different market participants, showing that CRT product prices ultimately reflect increases in CRTs prices.

3. Pass-through is always greater than 100% when firms use “cost-plus” pricing rules

Under certain conditions, I can make reliable conclusions about the magnitude of the pass-through rate based on a firm’s pricing policies. Specifically, if a firm uses cost-plus pricing,²⁵⁵ its pass-through rate is at least 100%. For certain types of demand, using a cost-plus rule is the profit-maximizing pricing strategy.²⁵⁶

In the case of cost-plus pricing in percentage terms, the pass-through rate is equal to the mark-up rate and is always greater than 100%. For example, suppose that a firm always marks costs up by 20%; if costs are \$100, then the firm sets price at \$120. When costs increase by \$1, price will increase by \$1.20 ($= \$1 \times 120\%$), and thus the pass-through rate is equal to 120% (= change in

²⁵⁴ See, e.g.,

- Kim London of Samsung testified: “Q. You mentioned earlier, I think you said the Marketing Department utilizes and sometimes relies on DisplaySearch information; is that accurate? A. That’s accurate.” 16 July 2012, Deposition of Samsung Electronics America 30(b)(6) Witness Kim London at 262:16-19.
- Roger De Moor of Philips testified about responsibilities of another Philips employee: “Q. Do you know what his responsibilities were? A. Collect information about market trends, working with DisplaySearch, and presenting to management the information on which they could base their plans.” 31 July 2012, Deposition of Philips Electronics North America Corporation, Inc. and Koninklijke Philips Electronics N.V. 30(b)(6) Witness Roger De Moor at 70:19 - 71:1.
- Yun Lee of LG Electronics testified: “Q. Okay. Who were the two third-party sources for market share information that you mentioned? A. One is a company called NPD. The other is a company called Display Search.” 11 July 2012, Deposition of LG Electronics 30(b)(6) Witness Yun Seok Lee at 78:8-11.
- William Whalen of Hitachi America testified: “Q. Do you know whether HAL used data sources such as Display Search? A. Yes.” 23 August 2012, Deposition of Hitachi America, LTD. 30(b)(6) Witness William Allen Whalen at 110:24 - 111:1.

²⁵⁵ Cost-plus pricing is the practice of applying a certain markup above cost to set price.

²⁵⁶ This is true if a firm faces a demand curve with constant elasticity of demand. Although price elasticity varies along most demand curves, it is the same at every point along a constant elasticity demand curve. In lay terms, this means that given a 1% increase in price—regardless of whether the starting price is at a high level or a low level—the quantity demanded will decline by the same percentage. Bulow, Jeremy I., and Paul Pfleiderer, February 1983, A Note on the Effect of Cost Changes on Prices, *The Journal of Political Economy*, Vol. 91(1), 182-185, p. 183.

price / change in cost = \$1 / \$1.20). Now consider a firm that uses cost-plus pricing in dollar terms. For example, suppose that a firm always sets price by adding \$40 to its costs. If costs are \$100, the firm sets a price of \$140. If costs increase to \$101, the firm increases its price to \$141. In the case of cost-plus pricing in dollar terms, the pass-through rate will always be equal to 100% (= change in cost / change in price = \$1 / \$1).

There is evidence that cost-plus pricing policies were used in the distribution channel for CRT products.²⁵⁷ To the extent that resellers follow these pricing policies, I can infer that a reliable estimate of the pass-through rate is at least 100%.

4. Pass-through is consistent with different prices, promotional pricing strategies, and focal point pricing strategies

²⁵⁷ See, e.g.,

- “Q. Would you sell your product above the FOB price? A. Yes. Q. Always? A. Sure. We needed – we required a markup. So we would buy it FOB, there would be a standard margin that Panasonic, PNA, would have to achieve.” 18 July 2012, Deposition of Panasonic North America 30(b)(6) Witness Edwin Wolff (Hereinafter “Panasonic 30(b)(6) Deposition of Edwin Wolff, 18 July 2012”), pp. 26:13-27:5.
- Roger De Moor of Philips testified regarding Philips Consumer Electronics margins on sales of CRT monitors to Dell: “Q. Did PCEC typically have a set margin they were trying to achieve when working with Dell? A. We all had. Q. Did that margin vary over time or was there a particular set one within each organization that they aimed for? A. That was on the product level within the organizations.” Philips 30(b)(6) Deposition of Roger De Moor, 31 July 2012, pp. 176:16-177:1.
- Edwin Wolff of Panasonic testified regarding price setting process: “We would meet with Circuit and Best Buy and a number of our retailers, and they’d say you have to be at this price, retail price, and here is our margin requirement as a retailer, I need to make this much money.” Panasonic 30(b)(6) Deposition of Edwin Wolff, 18 July 2012, p. 59:16-20.
- Kimura Mashiro of Panasonic testified regarding CRT product resellers’ profit margins: “Q. So the dealer margin number would always be a positive number? A. Yes, correct.” 19 July 2012, Deposition of Panasonic Corporation, Panasonic North America and MTPD 30(b)(6) Witness Mishiro Kimura (Hereinafter “Panasonic 30(b)(6) Deposition of Mishiro Kimura, 19 July 2012”), p. 69:22-24.
- Roger De Moor of Philips testified: “Q. So on bigger retailers, was there a particular margin that each different retailer always or often tried to achieve? MR. EMANUELSON: Objection, vague. A. That’s my understanding.” Philips 30(b)(6) Deposition of Roger De Moor, 31 July 2012, p. 302:3-7.
- Thomas Heiser of Hitachi USA testified regarding retailers’ margins: “Again, you know, at the time in ’96 it was our understanding that Circuit City and those guys, they typically were between 30 and 40 percent, 30 and 40 points max – margin, I mean, so... Q. Okay. And what do you mean by retail margins, just to make sure we’re on the same page? A. So if they bought a set for 700 from Hitachi, they’d sell it for 999. They would mark it up 30 percent or 40 percent was their markup. Q. And that was your understanding of approximately for the large retailers? A. Yeah, at that time.” Hitachi 30(b)(6) Deposition of Thomas Heiser, 03 July 2012, pp. 151:17-152:3.
- “That markup of nearly 50% of the total cost is a ‘healthy profit margin’ for Amazon, said Van Baker, a Gartner Inc. analyst, adding that most consumer products have markups of 20% to 25% of total cost. ‘A markup of 50% of total cost is almost impossible to do in consumer electronics just because the market is so competitive.’” Matt Hamblen, 22 April 2009, Material costs for Kindle 2 are about half its retail price, ComputerWorld, http://www.computerworld.com/s/article/9131974/Materials_costs_for_Kindle_2_are_about_half_its_retail_price_, accessed 14 September 2012, p. 1.

The pass-through rate gives the change in price given a change in cost; it is not directly a function of the price level and its existence is fully consistent with a variety of pricing practices that may be present in the distribution of CRT and CRT products. Specifically, pass-through occurs even when there is price variation across firms and/or products, loss-leader and discount pricing, and focal point pricing.

a) Different price levels are consistent with pass-through

CRTs with the same specifications (or CRT products with the same specifications) may be sold at different prices by different resellers; however, the fact that prices are not the same does not indicate that pass-through differs—or does not occur at all—for these products. While the products may be sold at different prices, they are sold in distribution channels that are highly competitive and, therefore, the pass-through rate will be similar across firms and will be close to 100%.²⁵⁸

In general, although two different firms may be selling a CRT product with the same specifications, from the consumer's perspective they are typically not selling the identical product because firms do more than merely hand over merchandise to purchasers. For example, different retailers provide different levels of customer service, product information, return policies, installation support, pre- and post-purchase consultation, repairs, and store warranties. Different retailers may experience different rental expenses based on the desirability and convenience of their store locations. Some retailers do not advertise at all, while others provide consumers with information pertaining to products available, prices, performance, and store locations. Some retailers operate only online, in which case shipping costs become relevant to the consumer for both the purchase and potential return. The price of the products offered by a retailer in a competitive distribution market reflect all of the costs incurred by the retailer; in turn, the price of the product bundled together with other services, only some of which are described above, will vary among retailers.

The following example illustrates that pass-through is consistent with different prices across retailers. Suppose that retailer A runs a no-frills operation and has cost of \$100 for a CRT monitor plus \$5 per sale in processing costs; intense competition leads retailer A to charge \$105. Retailer B runs a high-status, full-service operation, and has costs of \$100 for the same CRT monitor, \$10 per sale in processing costs, and \$10 per sale in customer service; intense competition leads retailer B to charge \$120. Thus, the same CRT monitor is available for \$105 from retailer A and for \$120 from retailer B. Now suppose that the cost for the CRT monitor increases to both retailers from \$100 to \$110. Retailer A will raise its price to \$115 and retailer B will raise its price to \$130. The price for the same CRT monitor is higher at retailer B, before and after the increase in the cost of the CRT, and both firms have 100% pass-through.

Prices may also vary across CRTs and CRT products, even at the same distribution firm. For example, graphics quality is superior on high definition TVs compared to standard definition TVs. Based on the superior graphics, the market price for high definition TVs will be higher than for standard definition TVs that are otherwise identical.²⁵⁹ Regardless of the fact that these

²⁵⁸ I discuss the effects of competition on the pass-through rate in Section VIII.C.1.

²⁵⁹ See, e.g.,

- Samsung TX-S2783 27" 4:3 CRT SlimFit TV's average retail price in the US in April 2006 was \$349.

products are differentiated across some specifications and sold at differing prices, pass-through still occurs. Further, because these products are sold in competitive distribution channels, the pass-through rate is expected to be close to 100%. There is nothing inconsistent between the pass-through of overcharges and product differentiation.

Consider a variation on the earlier numerical example. Suppose that no-frills retailer A sells a standard definition CRT TV model X and a high definition CRT TV model Y. Suppose A pays \$300 for the standard definition CRT TV and \$400 for the high definition CRT TV. Retailer A also bears other processing costs of \$5 for either the standard definition or the high definition CRT TV. Due to intense competition, retailer A sets price to cover its total costs, and prices the standard definition TV model X at \$305 and high definition TV model Y at \$405. Now the price of each CRT TV increases. Suppose the cost of CRT TV model X increases to \$310 and the price of CRT TV model Y increases to \$417. Retailer A again sets price to cover its full costs, so prices X at \$315 and Y at \$422. In both cases, retailer A has fully passed on its cost increases. In one case cost increased by \$10, as did price; in the other cost increased by \$17, as did prices.

The methods that I describe in Section IX.B can be applied to a situation where the price for the same CRT or CRT product differs across sellers and/or the price for different CRTs or CRT products varies with their characteristics.

b) Loss-leader and other discount pricing is consistent with pass-through

Firms sometimes engage in a variety of pricing techniques to attract customers, including offering discounts (sales) and rebates or using loss-leaders.²⁶⁰ These pricing techniques are simply different forms of marketing expenditure: a reseller incurs a cost in the form of reduced sales revenue in order to entice consumers to purchase its other products. A firm that chooses to incur these marketing expenditures in the actual world would have the same incentive to incur these expenditures in the but-for world in which no price-fixing conspiracy existed. In the but-for world, the only difference would be that the firms' original costs were lower absent the alleged overcharge.

The following example illustrates this point. Suppose retailer A has costs of \$300 for a TV, and \$5 in per sale processing costs. Assuming a competitive environment, it will sell the TV for \$305. Suppose retailer A decides to incur a \$10 marketing cost per sale in the form of a sale price, which results in the TV being sold for \$295 (below its cost). Now consider a world in which the cost for the same TV to retailer A is \$260 instead of \$300. Assuming the retailer passes through 100% of its cost change and still incurs the same marketing cost, the resulting price is \$255. In this example, the retailer is still spending \$10 per unit on marketing (it has product and processing costs of \$265, which are discounted by \$10 as a marketing strategy). The retailer is making the same per-unit profit, which is negative \$5 (the expectation is that the reseller will make up this loss on the sale of other more profitable sales, either during the same visit or sometime in the future). In this example, the retailer has passed-through 100% of the reduced TV price: the cost to the retailer was reduced by \$40, the same amount by which the

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- Samsung TX-S2782H 27" 4:3 CRT SlimFit HDTV's average retail price in the US in April 2006 was \$524.

Witsview, April 2007, Monthly Major Region Street Price Book, LGE00082765.

²⁶⁰ The term loss-leader refers to an item being sold at a discounted price, sometimes at or even below cost. The purpose of this pricing practice is to attract customers, which will increase sales on other, more profitable items. Loss-leaders are essentially temporary sales promotions.

price to the consumer was reduced. In this manner, it is evident that incurring marketing costs in the form of discounts or sale prices is unrelated to whether input costs are being passed through, and 100% pass-through of the (savings from the) eliminated overcharge is completely feasible even if the firm is “selling at a loss”.²⁶¹

c) Focal point pricing is consistent with pass-through

Focal point pricing is the tendency for firms to set prices at specific price points, which usually end in “9”, such as \$99. The adoption of this pricing strategy does not prevent the pass-through of overcharges. First, a reseller can pass through cost changes while still using focal point pricing. Second, quality adjustments can be made to offset cost changes, so that the original focal price can be kept. In either event, the result remains that the overcharge is passed through to the buyer.

Suppose that a firm that uses focal point pricing faces a cost increase. The reseller can simply increase the price to a higher focal point. Suppose a TV OEM sells a TV that includes a CRT tube for \$399, and that the cost of the tube increases from \$60 to \$90. The TV OEM could increase the price of the TV from \$399 to \$429 to compensate for the \$30 cost increase. As this example shows, there is nothing inconsistent between focal point pricing and the pass-through of overcharges.

D. Summary: There is common impact on class members

I find that the cartel effectively increased price and that the increase in price was common to direct purchasers. Furthermore, based on economic theory and the documentary evidence, I find that the price increase to direct purchasers is passed through to indirect purchasers. Thus, class members suffered common impact. The analyses that support my conclusion are based on common evidence and are applicable to all class members. The analyses are not dependent on which type of CRT product was purchased, who purchased the CRT, from whom the product was purchased, nor when the product was purchased.

IX. Damages from overcharges are capable of proof at trial through evidence and methods common to the class

Class members did not directly purchase CRTs from Defendants but rather purchased CRT products such as monitors or TVs that incorporated CRTs manufactured by Defendants. One method for measuring the antitrust damages to indirect purchasers is to first measure the antitrust overcharge imposed by Defendants on direct purchasers and to then measure the portion of that direct overcharge that was passed down the distribution chain to members of the class. In this section I describe several formulaic methods for measuring the overcharge on direct purchasers.

A. Measurement of the antitrust overcharges to direct purchasers is susceptible to common proof

Defendants imposed an overcharge on a direct purchaser if, as a result of Defendants’ conspiracy, the price that the direct purchaser paid was above what the direct purchaser would have paid absent the cartel. Consequently, the amount of the antitrust overcharge to any direct purchaser can be quantified by subtracting the price that the direct purchaser would have paid but for the cartel – the “but-for price” – from the actual price paid by the direct purchaser.

²⁶¹ This is true for any positive pass-through rate.

Because Defendants colluded, the but-for world in which they set prices independently did not exist. As a result, measuring the overcharge to direct purchasers necessarily involves making predictions regarding outcomes that would have occurred had Defendants not engaged in collusive conduct.²⁶² There are at least four sources from which a reasonable measure of the but-for price can be obtained. First, a measure of the but-for CRT price can be obtained from an analysis of how CRT prices are related to demand and supply conditions in the CRT market when there is no collusive conduct. Second, the but-for CRT price can be calculated as the price that would have afforded Defendants the same profit margin that firms operating in industries that faced demand and cost structures similar to the CRT industry but that were not cartelized were able to earn. Third, an economic model that integrates the characteristics of the CRT industry can be used to calculate the price that would have maximized Defendants' profits if they had acted independently. A fourth reasonable basis is an estimate of the reduction in Defendants' market power had they behaved independently rather than collusively.

Empirical and qualitative information are important determinants of the model or models most appropriate for this case.²⁶³ Both types of information will continue to become available through research and discovery. While I have not, at this stage of the proceedings, conducted a full and complete review of all data produced or expected to be produced, I describe four formulaic approaches to estimating the but-for price of Defendants' CRTs using evidence that is common across the class and for which I have engaged in sufficient investigation to assure myself that such data are likely to be available to allow the method to be implemented.

²⁶² See, e.g.,

- "Proving as a fact something that never occurred ('what the plaintiff's situation would have been in the absence of the defendant's antitrust violation') is impossible. Resort to assumptions and inferences, supported by real-world data, evidence, and economic theory, is inevitable." American Bar Association, 2010, *Proving Antitrust Damages: Legal and Economic Issues*, Second Edition, ABA Publishing: Chicago, p. 56.
- "Quantifying damages involves estimating the price that would have occurred absent the cartel during the period of the cartel. Clearly, the price we need is not and never will be observable so that the exercise will always rely on assumptions and a certain degree of speculation." Davis, Peter and Eliana Garces, 2010, *Quantitative Techniques for Competition and Antitrust Analysis*, Princeton University Press: Princeton, p. 352.

²⁶³ See, e.g.,

- Additional data can help improve the precision of the estimate of a particular variable's impact on the dependent variable as well as improving the power of statistical tests. Kennedy, Peter, 26 February 2008, *A Guide to Econometrics*, 6th Edition, Wiley-Blackwell: Malden, pp. 194-197.
- "Which methodology to use will be a matter of judgment by the economist on a case team, ideally informed by her colleagues about such things as potentially appropriate natural experiments. The best method will greatly depend on the details of the case, the data available, and the question(s) which must be answered." Davis, Peter, and Eliana Garces, 2010, *Quantitative Techniques for Competition and Antitrust Analysis*, Princeton University Press: Princeton, p. 556.
- "[I]n antitrust enforcement it is often possible, as well as highly beneficial, to use documents and deposition or oral testimony to confirm the specification of the model being utilized in an empirical study. To do so requires an appropriate mix of historical data, hypotheticals, and assumptions about behavior based on qualitative techniques." Baker, Jonathan B., and Daniel L. Rubinfeld, 1999, *Empirical Methods in Antitrust Litigation: Review and Critique*, *American Law and Economics Review*, Vol. 1, No. 1, 386-435, p. 431.

For each approach to estimating the but-for price, I describe the commonality across class members of the economic model useful for measuring the but-for price, the data requirements to fit the model to the CRT industry, and the likely availability of such data in the present case.

1. Economic determinants method: Measurement of overcharges based on competitively-determined prices

Prices and quantities are determined by the demand, cost, and competitive conditions present in an industry. One basis for determining the price that Defendants would have charged for CRTs if they had set prices independently is to quantify the relationship between prices and the demand, cost, and competitive conditions in the CRT industry using market data from periods subject to and not subject to price-fixing.²⁶⁴ Economists often use regression analysis to quantify the relationship between multiple variables in order to explain or predict an outcome of interest.²⁶⁵ In the present case, regression analysis can be implemented using data from the CRT industry to understand how the price of a CRT is impacted by the presence of the cartel independently of the impact on price by demand, cost, and market structure variables that are not affected by the cartel.

One implementation of the regression method is to estimate a “reduced-form” price equation.²⁶⁶ Specifically, the pricing equation to be estimated would have CRT price as the dependent variable on the left-hand side of the equation, and demand and cost variables unaffected by the conspiracy as well as a measure of the market structure as the independent variables on the right-

²⁶⁴ This method is often called a before-and-after method. See, e.g.,

- American Bar Association, 2010, *Proving Antitrust Damages: Legal and Economic Issues*, Second Edition, ABA Publishing: Chicago.
- Connor, John M., February 2001, *Our Customers Are Our Enemies: The Lysine Cartel of 1992-1995*, *Review of Industrial Organization*, Vol. 18(1), pp. 5-21.
- Davis, Peter, and Eliana Garces, 2010, *Quantitative Techniques for Competition and Antitrust Analysis*, Princeton University Press: Princeton.

²⁶⁵ Regression analysis is routinely used by economists and has been accepted by the courts. For example, all graduate programs in economics require coursework in econometrics, which is essentially the application of regression analysis to economic issues. Regarding the use of regression analysis by the courts, see, e.g.,

- “Multiple regression and other econometric methods have been used frequently in cases brought by the competition authorities and in private litigation.” Rubinfeld, Daniel L., 2008, *Quantitative Methods*, in *Antitrust*, in American Bar Association (Eds.), *Competition Law and Policy*, Section of Antitrust Law, Issue 1, ABA Publishing: Chicago, 723-742, p. 723.
- “The legal requirements for regression analysis fall under the rules for testimony by experts...Regression analyses have met these requirements many times in litigation for a wide range of issues, including the estimation of antitrust damages.” American Bar Association, 2010, *Proving Antitrust Damages: Legal and Economic Issues*, Second Edition, ABA Publishing: Chicago, pp. 128-129.
- Rubinfeld, Daniel L., 2000, *Reference Guide on Multiple Regression*, in Federal Judicial Center, and National Research Council (Eds.), *Reference Manual on Scientific Evidence*, Third Edition, National Academies Press: Washington, D.C., 303-358.

²⁶⁶ “A ‘reduced form’ model is a single equation that describes prices (the dependent variable) as a function of various exogenous factors thought to influence supply and demand (such as costs, prices of substitutes, etc.).” American Bar Association, 2010, *Proving Antitrust Damages: Legal and Economic Issues*, Second Edition, ABA Publishing: Chicago, p. 201.

hand side of the equation.²⁶⁷ An indicator variable on the right-hand side of the equation would be used to indicate whether the observations of price, cost, and demand are from a period in which the cartel was active or not.²⁶⁸ Finally measures of the market structure such as the number of firms in the industry and industry concentration levels may be added.²⁶⁹

Defendants are alleged to have engaged in a price-fixing conspiracy from at least March 1, 1995 until at least November 25, 2007.²⁷⁰ Data observations falling within this time frame would be included as part of the “cartel period” in the regression. Data observations outside of this period provide information regarding price determination in the absence of the cartel.

In the purest implementation of the method, transactions from outside of the cartel period would be free of any collusive impact. However, it is possible that transactions from outside the alleged class period were impacted by the cartel. For example, if some degree of communications between some CRT manufacturers occurred before March 1, 1995, prices prior to the class period could include some artificial inflation.²⁷¹ Likewise, prices may remain at inflated levels after a cartel ceases to explicitly communicate because firms are able to implicitly coordinate behavior or because of cartel members’ incentive to keep prices high to reduce their expected damages.²⁷² If the period outside of the cartel includes some prices that were impacted by the

²⁶⁷ “The most common statistical method employed in antitrust litigation involves the estimation of ‘reduced-form’ price equations. A typical reduced-form model might explain the variation in the price of a product as a function of a series of variables relating to cost, demand, and market structure.” Rubinfeld, Daniel L., 2008, Quantitative Methods, in Antitrust, in American Bar Association (Eds.), Competition Law and Policy, Section of Antitrust Law, Issue 1, ABA Publishing: Chicago, 723-742, p. 724.

²⁶⁸ An indicator variable is equal to one if the condition is present and zero otherwise. These variables are also sometimes called “dummy” variables. “The dummy variable approach is appealing because it can be applied even where there is a relative paucity of data in the nonconspiratorial period.” Rubinfeld, Daniel L., 2008, Quantitative Methods, in Antitrust, in American Bar Association (Eds.), Competition Law and Policy, Section of Antitrust Law, Issue 1, ABA Publishing: Chicago, 723-742, p. 740.

²⁶⁹ See, e.g.,

- “Market *structure* consists of those factors that determine the competitiveness of a market. Market structure affects market performance through the *conduct* or behavior of firms.” Carlton, Dennis W., and Jeffrey M. Perloff, 2005, Modern Industrial Organization, Fourth Edition, Person Addison Wesley, p. 244, emphasis in original.
- “[V]ariables related to market structure may appear in the reduced-form price equation because they reflect the extent to which the firms are able to exercise market power.” Rubinfeld, Daniel L., 2008, Quantitative Methods, in Antitrust, in American Bar Association (Eds.), Competition Law and Policy, Section of Antitrust Law, Issue 1, ABA Publishing: Chicago, 723-742, p. 726.

²⁷⁰ Complaint, ¶1.

²⁷¹ The complaint suggests the possibility of some limited information exchanges amongst Defendants prior to the start of the class period. “In the early 1990s, representatives from Samsung, Daewoo, Chunghwa and Orion visited each other’s factories in S.E. Asia. During this period, these producers began to include discussions about price in their meetings. The pricing discussions were usually limited, however, to exchanges of the range of prices that each competitor had quoted to specific customers.” Complaint, ¶133.

²⁷² See, e.g.,

- Connor, John M., February 2001, Our Customers Are Our Enemies: The Lysine Cartel of 1992-1995, Review of Industrial Organization, Vol. 18(1), pp. 5-21.

cartel, then this method will be conservative in that it will understate the impact of the cartel on prices and thus understate the overcharge to direct purchasers.

Observations on CRT prices are available from Defendants' sales data. Presently, Chunghwa, Hitachi, LG, Panasonic, Philips, Samsung, and Toshiba have produced data on sales prices and quantities as well as model numbers, from which various product aspects such as application, size, and other characteristics can be recovered. Chunghwa, Hitachi, Panasonic, Philips, and Toshiba have provided sales data from time periods before the beginning of the damages period, the earliest of which were produced by Philips from the beginning of 1993. Exhibit 13 provides details on the sales data thus far produced. I expect to receive additional data from Defendants.

The right-hand side of the reduced-form price equation includes variables that control for the non-cartel determinants of prices. Factors that control for the effect of consumer demand on prices include income and the prices of related goods. Available measures of income include publicly available data on U.S. personal income, U.S. GDP, and U.S. employment data.²⁷³ Other measures related to demand are also publicly available. For example, the World Bank's Global Economic Monitor data series include information on global economic activity.²⁷⁴

Cost variables that are typically used in a reduced-form price equation include costs of raw materials and labor. Firms regularly keep track of raw material costs and data produced to this point by Defendants contain such information.²⁷⁵ Measures of raw material costs are also

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- Harrington, Joseph E. Jr., December 2004, Post-Cartel Pricing During Litigation, *The Journal of Industrial Economics*, Vol. 52(4), pp. 517-533.

²⁷³ See e.g.,

- The Bureau of Economic Analysis provides data on total personal income for the U.S. Bureau of Economic Analysis, Undated, Table 2.1 Personal Income and Its Disposition, <http://www.bea.gov/iTable/print.cfm?fid=631897CBF123A3CCA6F9F71B6A275E842AA969E308E74E2936D143BC69BC3545ECCA4DCB961F5A49C1F1068066A32C234F923A965C2312F52A30F6C9A18A218F>, accessed 17 September 2012.
- The Bureau of Economic Analysis provides data on the GDP for the U.S. Bureau of Economic Analysis, 29 August 2012, Table 1.1.5 Gross Domestic Product, <http://www.bea.gov/iTable/print.cfm?fid=547158FB3824F0E271ED75AEE6081FEA3042E3C4B0FA3B6C7D755CEAF2B26B2DD7F907C33DDA1576C3AAE02E586FBB5371F86EAFBBFCAC88288F0A08D75C9DDF>, accessed 17 September 2012.
- The Bureau of Labor Statistics provides employment data for the U.S. U.S. Department of Labor, Bureau of Labor Statistics, Undated, Labor Force Statistics from the Current Population Survey, <http://data.bls.gov/pdq/querytool.jsp?survey=ln>, accessed 17 September 2012.

²⁷⁴ The World Bank provides data on the world GDP, world GDP per capita, gross national expenditure, and household final consumption expenditure. The World Bank, Undated, World Development Indicators and Global Development Finance, <http://databank.worldbank.org/Data/Views/VariableSelection/SelectVariables.aspx?source=World%20Development%20Indicators%20and%20Global%20Development%20Finance>, accessed 17 September 2012.

²⁷⁵ See, e.g.,

- This document gives material costs for 1994. Philips Multimedia Flat Displays, 1995, Budget 1995, FOX00289507 - FOX00289799 at 9665.
- This document gives material costs for 1995. Philips, April 1996, Ottawa TVT Business Model, LPD_00031538 at 1538.

available from public data sources.²⁷⁶ Measures of labor costs are also available in Defendant data²⁷⁷ and publicly available data sources.²⁷⁸ Additional data that can be included in the

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- This document gives material costs for 1998. Philips, 1999, Business Financial Information 1999 Q3 Rolling Forecast, EIN0096752 - EIN0097476 at 7100.
 - This document gives material costs for 1999. Chunghwa Picture Tubes, LTD, 30 January 1999, Contact Report 17" CDT Material and Production Costs Exchange, CHU00028453 - CHU00028455 at 8453.01E - 8453.02E.
 - This document gives material costs for 1998, 1999, and part of 2000. Salomon Smith Barney Inc., 22 May 2001, Project Mercury Confidential Information Memorandum, EIN0017699 - EIN0018075 at 8028 - 18065.
 - This document gives the material costs for September 2001 and January to July 2002. Undated, PHLP-CRT-080312, PHLP-CRT-080312.
 - This document gives material costs for April 2003 to March 2004. MT Picture Display, Undated, Cost by Model, MTPD-00653465.
 - This document contains material costs for 2004. CPT, Samsung SDI, 02 November 2004, Contact Report, CHU00033227 - CHU00033228 at 3228.01E.
 - This document gives material costs for 2004 and 2005. MT Picture Display, Undated, MTPD-00653594, MTPD-00653594 at 3594E.
 - This document provides material costs for 2005. Samsung SDI, 2005, Y2005 Status of Units by Model, SDCRT-0201579.
 - This document provides labor costs for 2006. Samsung SDI, 12 July 2006, 2006 MARGINAL Unit Cost by PRODUCT; by LINE, SDCRT-0203189.
 - This document provides material costs for 2007. Samsung SDI, 09 October 2007, 2007 SEPT S-PROJECT RESULTS, SDCRT-0203191.

²⁷⁶ See, e.g.,

- The World Bank provides petroleum and natural gas price series. The World Bank, 07 September 2012, World Bank Commodity Price Data (Pink Sheet), http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1304428586133/PINK_DATA.xlsx, accessed 17 September 2012.
- The Bureau of Labor Statistics provides a Producer Price Index for machine-made pressed and blown glass and glassware. U.S. Department of Labor, Bureau of Labor Statistics, Undated, Producer Price Index Industry Data Machine-made pressed and blown lighting, automotive, and electronic glassware, <http://data.bls.gov/pdq/querytool.jsp?survey=pc>, accessed 18 September 2012.

²⁷⁷ See e.g.,

- This document gives labor costs for 1993 and 1994. Philips Multimedia Flat Displays, 1995, Budget 1995, FOX00289507 - FOX00289799 at 9665.
- This document provides labor costs for 1993 and 1994. Philips Multimedia Flat Displays, 1995, Budget 1995, FOX00289507 - FOX00289799 at 9792.
- This document gives labor costs for 1993 and 1994. Philips Multimedia Flat Displays, 1995, Budget 1995, FOX00289507 - FOX00289799 at 9784.
- This document gives the labor costs for 1995. Philips, April 1996, Ottawa TVT Business Model, LPD_00031538 at 1538.

regression analysis to account for supply-side factors outside of the control of the cartel include, for example, publicly available data on interest rates, which provide a proxy for the opportunity cost of capital.²⁷⁹

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- This document gives the labor costs for 1998, 1999, and part of 2000. Salomon Smith Barney Inc., 22 May 2001, Project Mercury Confidential Information Memorandum, EIN0017699 - EIN0018075 at 8028 – 18065.
 - This document gives the labor costs for Q1 1999. Philips, 1999, Business Financial Information 1999 Q3 Rolling Forecast, EIN0096752 - EIN0097476 at 7053-7057.
 - This document gives labor costs for quarter 4 2001 and all of 2002. Philips, Undated, Operation Performance Indicators, PHLP-CRT-096125 at 6125.
 - This document contains labor costs for 2004. CPT, Samsung SDI, 02 November 2004, Contact Report, CHU00033227 - CHU00033228 at 3228.01E.
 - This document provides labor costs for 2005. Samsung SDI, 2005, Y2005 Status of Units by Model, SDCRT-0201579.
 - This document provides labor costs for 2006. Samsung SDI, 12 July 2006, 2006 MARGINAL Unit Cost by PRODUCT; by LINE, SDCRT-0203189.
 - This document provides labor costs for 2007. Samsung SDI, 09 October 2007, 2007 SEPT S-PROJECT RESULTS, SDCRT-0203191.

²⁷⁸ See e.g.,

- Information on China's manufacturing wages is available from Banister, Judith, August 2005, Manufacturing Earnings and Compensation in China, <http://www.bls.gov/opub/mlr/2005/08/art3full.pdf>, accessed 10 September 2012, p. 35.
- Labor costs per employee for the manufacturing industry for Germany, Japan, Korea, and the United States are available from OECD.StatExtracts, Undated, Unit Labour Costs - Annual Indicators: Labour Compensation per Employee/Hour (\$US PPP adjusted), <http://stats.oecd.org/Index.aspx?queryname=430&querytype=view#>, accessed 10 September 2012 at 2.
- This document provides hourly compensation costs for production workers in computer and electronic product manufacturing in Mexico. U.S. Department of Labor, Bureau of Labor Statistics, 19 May 2006, Hourly Compensation Costs for Production Workers in Manufacturing Industries Mexico, 1975-2004, <ftp://ftp.bls.gov/pub/special.requests/foreignlabor/flsmexmaq.txt>, accessed 17 September 2012, pp. 12-13.

²⁷⁹ See, e.g.,

- The Federal Reserve provides U.S. interest rates. Federal Reserve, 12 September 2012, H.15 Selected Interest Rates, <http://www.federalreserve.gov/datadownload/Build.aspx?rel=H15>, accessed 20 September 2012.
- The Bank of Korea provides Korean interest rates. The Bank of Korea, Undated, ECOS Economic Statistics System, http://ecos.bok.or.kr/EIndex_en.jsp, accessed 20 September 2012.
- The Bank of Japan provides Japanese interest rates. Bank of Japan, Undated, Bank of Japan Statistics, <http://www.boj.or.jp/en/statistics/index.htm/>, accessed 20 September 2012.
- The Bank of Mexico provides Mexican interest rates. Banco de Mexico, Undated, Banco de Mexico Statistics, <http://www.banxico.org.mx/estadisticas/statistics.html>, accessed 20 September 2012.
- The World Bank provides interest rates for China, Germany, Malaysia, Thailand, and India. World Bank, Undated, World dataBank, <http://databank.worldbank.org/ddp/home.do>, accessed 20 September 2012.

Once the pricing equation has been estimated from the data, the coefficient on the cartel indicator variable – which isolates the impact of the cartel on CRT prices from changes in prices due to changes in demand, cost, and competitive conditions – can be used to adjust the observed cartel price during the damages period to obtain the but-for CRT price.

The reduced-form regression analysis is a widely used method that can be implemented to quantify the impact of the cartel while controlling for the influence of demand, costs, and market structure on prices. The reduced-form regression formula is common across members of the class. Additionally, the data to implement this method are available to all class members. Consequently, the regression analysis provides a formulaic method, based on data common to members of the class, for measuring the direct overcharge.

2. Benchmark comparisons method: Measurement of overcharges based on a benchmark product

Another basis for the but-for price is to identify an industry that faced similar demand and cost structures as those that were present in the CRT industry but that was not cartelized. Market outcomes in this industry could then substitute – or “proxy” – for the outcomes that would have occurred in the CRT industry absent the cartel. Such a proxy is called a benchmark. Because the two markets are similar to one another except for the collusion in the CRT market, differences between economic outcomes in the benchmark market and the CRT market provide a measure of the impact of collusion on the CRT market. I now describe benchmark products that provide a reasonable basis for measuring the overcharge due to the cartel.

a) Reasonable CRT benchmark products

Two electronics products that do possess characteristics that make them potentially reasonable benchmarks for the but-for world in the present case are VHS recorders and portable CD players. Like CRTs, both of these products exhibit scale sensitive manufacturing, are precision electronic devices, and were replaced by alternative technologies – VHS recorders were replaced by DVR recorders and portable CD players by hard drive and flash memory digital music players such as the iPod. Also like CRTs, the declining demand in both industries was foreseeable by both consumers and manufacturers. As a result, consumer considerations such as whether to buy a new version of the current technology or wait and purchase the emerging technology were likely to have been similar between the CRT industry and the benchmark industries. Similarly, manufacturers in all three of these industries had to make production and sales decisions regarding the current technologies with the knowledge that demand for these products were being replaced by demand for the emerging technologies.

Moreover, in addition to sharing an economic environment marked by declining demand due to new technologies, CRTs, VHS recorders, and personal CD players also shared common manufacturers. For instance, Panasonic, Philips, and Samsung manufactured both VHS recorders and personal CD players; Thomson manufactured personal CD players; and Daewoo, Goldstar (LG), Hitachi, Tatung, and Toshiba manufactured VHS recorders. When the same firms produced both the benchmark products and CRTs, company-specific management skill and name recognition are held constant. Any differences in market outcomes are more likely to represent the impact of the cartel than the impact of other differences between the benchmark and CRT industries. Additionally, the data available for each market are likely to overlap substantially since they will originate from the same firm.

b) Profitability estimates

Absent collusion, the cartel members' profits would have been subject to additional competitive restraints. A measure of by how much collusion increased cartel members' profits can be obtained by comparing the profits of the benchmark product to the profits of cartel members.²⁸⁰ Two measures of profits that are used by economists are rates of return – which measure the return on resources invested in a project (or line of business), and price-cost margins – which measure the ability to price above cost.²⁸¹ Estimates of the internal rate of return (IRR) can be obtained from asset cost and revenue data and is regularly calculated by firms.²⁸² Price-cost margins also can be calculated from financial data kept in the ordinary course of business. For example, average variable costs can be calculated from accounting data (e.g., labor and materials costs) and used to obtain an estimate of the marginal cost.²⁸³ Section IX.2 describes data sources collected thus far that can be used to calculate the IRR and price-cost margins for CRTs. Given Defendants track such information for CRTs, it is likely that they also have similar data for their production of benchmark products. In addition, VHS and personal CD player industry data are also available from market research firms.²⁸⁴

²⁸⁰ The data used to calculate profits are typically obtained from financial reports that contain accounting measures of revenue and costs, which may differ from economic revenues and costs. Nonetheless, accounting data can be adjusted to provide measures of economic profits. See, e.g.,

- “[I]t has been established in the literature that there is a theoretical link between IRR and accounting rates of profitability, and hence that accounting data can be used in a meaningful way to assess the IRR.” OXERA, July 2003, Assessing Profitability in Competition Policy Analysis, Office of Fair Trading, Economic Discussion Paper 6, p. 41.
- “The basis for measuring economic damages should be economic profit, but analysts are often limited by available data and must use accounting data to estimate damages. Fortunately, accounting data often can be adjusted to produce an estimate of true lost economic profits.” American Bar Association, 2010, Proving Antitrust Damages: Legal and Economic Issues, Second Edition, ABA Publishing: Chicago, p. 99.

²⁸¹ See, e.g.,

- Carlton, Dennis W., and Jeffrey M. Perloff, 2005, Modern Industrial Organization, Fourth Edition, Person Addison Wesley, p. 247
- “From an economic point of view, the profitability of an activity can be defined in terms of net increases in value resulting from that activity and realised over time. The IRR [internal rate of return] and NPV [net present value] are two commonly accepted and well-established methods for measuring the profitability of an activity.” OXERA, July 2003, Assessing Profitability in Competition Policy Analysis, Office of Fair Trading, Economic Discussion Paper 6, p. 9.

²⁸² Results of a large scale survey of chief financial officers (CFOs) indicate that the internal rate of return is “always” or “almost always” calculated as part of the capital budgeting process of over 75% of CFOs. Graham, John R., and Campbell R. Harvey, 2001, The Theory and Practice of Corporate Finance: Evidence From the Field, Journal of Financial Economics, Vol. 61, p. 6.

²⁸³ I describe in more detail in Section IX.3.b) why declining demand and limited alternative uses of CRT production equipment and facilities make average variable costs a reasonable measure of marginal costs for this particular industry.

²⁸⁴ The industry research firm NPD Group, for example, lists “Personal CD Players” and “Video Cassette Recorder/Player” as two categories for which data are available. NPD Group, Undated, Consumer Technology Market Research, <https://www.npd.com/wps/portal/npd/us/industry-expertise/technology/consumer-technology/>, accessed 21 September 2012.

Using the appropriate algebra, both the IRR and the price-cost margin formulas can be solved in terms of price so that the but-for price can be obtained from either the but-for IRR or the but-for price-cost margin.

The benchmark is based on a comparison of market-level characteristics and therefore serves as a benchmark for the CRT industry as a whole. Additionally, each candidate profitability formula from which Defendants' but-for prices are calculated is common across the class. Thus, this method provides a common method based on common evidence with which to measure the overcharge imposed on direct purchasers.

3. Simulation method: Measurement of overcharges based on a model of the but-for CRT industry

The economic impact of collusion on competition and prices is analogous to that of a merger – firms that previously competed against each other without regard for how their own behavior impacted the profits of their competitors (for instance, without concern that lowering their own price may reduce their competitors' profits) begin to make decisions in such a way as to maximize collective rather than individual profits.²⁸⁵ Economists have developed formulaic models that integrate consumer demand, cost conditions, and firm interaction in order to analyze the likely price outcomes following a merger;²⁸⁶ this same approach can be applied using data from the CRT industry to calculate the effect of the cartel on CRT prices.

This method can be used to calculate but-for prices based on information and data on consumer demand, production costs, and firm behavior. I now describe in more detail each of the components of such a model and explain how the model can be combined with data from the CRT industry to compute the but-for prices.

a) Demand models

All firms, be they operating in a monopolistic or perfectly competitive market, are constrained in their pricing behavior by consumers' willingness to pay for their goods or services.²⁸⁷ In

²⁸⁵ Baker, Jonathan B., and Timothy F. Bresnahan, June 1985, The Gains from Merger or Collusion in Product-Differentiated Industries, *Journal of Industrial Economics*, Vol. 33, Issue 4, A Symposium on Oligopoly, Competition and Welfare, 427-444.

²⁸⁶ These models are generally known as "merger simulation" models as they combine economic theory with data from the industry to simulate the price outcomes that would result were firms that were previously independent to merge. See, e.g.,

- Werden, Gregory J., and Luke M. Froeb, October 1994, The Effects of Mergers in Differentiated Products Industries: Logit Demand and Merger Policy, *Journal of Law, Economics, & Organization*, Vol. 10(2), pp. 407-426.
- Epstein, Roy J., and Daniel L. Rubinfeld, March 2004, Merger Simulation with Brand-Level Margin Data: extending PCAIDS with Nests, *Advances in Economic Analysis & Policy*, Vol. 4(1), Article 2.
- U.S. Department of Justice and Federal Trade Commission, 19 August 2010, 2010 Horizontal Merger Guidelines.
- Davis, Peter, and Eliana Garces, 2010, *Quantitative Techniques for Competition and Antitrust Analysis*, Princeton University Press: Princeton.

²⁸⁷ "Company revenues depend on the preferences of consumers and so necessarily demand is a fundamental element in shaping market outcomes." Davis, Peter, and Eliana Garces, 2010, *Quantitative Techniques for Competition and Antitrust Analysis*, Princeton University Press: Princeton, p. 436.

particular, firms must balance the desire to charge higher prices against the loss of sales due to the higher prices. The elasticity of demand that a firm or (group of firms) faces is a key determinant of the ability to exercise market power.²⁸⁸ Demand models provide mathematical equations to quantify how much consumers are likely to change the amount of a good they purchase in response to a price change – which economists refer to as the elasticity of demand.²⁸⁹

Economists have developed a variety of methods to measure consumer demand.²⁹⁰ Economists have, for example, estimated the elasticities of demand for individual models of personal computers (PCs) – an industry which, like the CRT industry, regularly experiences the release of new models and whose products are differentiated by attributes for which more is better (e.g., processor speed and memory in PCs and screen size for CRTs) using data on prices, market shares, and product attributes.²⁹¹ Industry and firm specific demand elasticities for differentiated products can be estimated using data on quantities, prices, and product characteristics.²⁹² Exhibit

²⁸⁸ See, e.g.,

- “Whether the force of demand substitution is sufficient to prevent the exercise of market power depends in part on the extent to which consumers will substitute away in the event prices were to rise (the own elasticity of demand).” Baker, Jonathan B. and Daniel L. Rubinfeld, 1999, Empirical Methods in Antitrust Litigation: Review and Critique, *American Law and Economics Review*, Vol. 1, No. 1, p. 405.
- “To prove or disprove market power, economists now commonly estimate demand elasticities, and recent cases suggest that courts will rely on such evidence.” Werden, Gregory J., 1998, Demand Elasticities in Antitrust Analysis, *Antitrust Law Journal*, Vol. 66, 363-414, p. 380.
- “It is impossible to quantify the likelihood or the effect of a change in firm behavior if we do not have information about the potential response of its customers.” Davis, Peter, and Eliana Garces, 2010, *Quantitative Techniques for Competition and Antitrust Analysis*, Princeton University Press: Princeton, p. 1.

²⁸⁹ More formally, the “own-price elasticity of demand” is the percentage change in the quantity demanded divided by the percentage change in the price; the slightly shorter terminologies “elasticity of demand” or “demand elasticity” are typically used.

²⁹⁰ See, e.g.,

- Baker, Jonathan B., and Timothy F. Bresnahan, June 1985, The Gains from Merger or Collusion in Product-Differentiated Industries, *Journal of Industrial Economics*, Vol. 33, Issue 4, A Symposium on Oligopoly, Competition and Welfare, 427-444.
- Baker, Jonathan B., and Timothy F. Bresnahan, November 1987, Estimating the Residual Demand Curve Facing a Single Firm, *International Journal of Industrial Organization*, Vol. 6, 283-300.
- Stavins, Joanna, 1997, Estimating Demand Elasticities in a Differentiated Product Industry: The Personal Computer Market, *Journal of Economics and Business*, Vol. 49(4), 347-367.
- Werden, Gregory J., 1998, Demand Elasticities in Antitrust Analysis, *Antitrust Law Journal*, Vol. 66, 363-414.
- “Information about the extent and nature of demand substitution can be obtained in multiple ways, not all quantitative... The wide range of techniques available increases the prospects for obtaining quantitative information on consumers’ demand for the product or products at issue in antitrust litigation.” Baker, Jonathan B., and Daniel L. Rubinfeld, 1999, Empirical methods in antitrust litigation: review and critique, *American Law and Economics Review*, Vol. 1, No. 1, 386-435, p. 406.

²⁹¹ Stavins, Joanna, 1997, Estimating Demand Elasticities in a Differentiated Product Industry: The Personal Computer Market, *Journal of Economics and Business*, Vol. 49(4), 347-367.

²⁹² See, for e.g.,

13 details the data produced by Defendants at present that contain information on CRT prices, quantities, and product characteristics.

b) Costs

In addition to demand, costs play a role in firm behavior. Specifically, to maximize profits, a firm will produce such that the revenue the firm would receive if it produced one more unit would just equal its cost from producing that unit.²⁹³ That is, profit maximization requires that firms produce until marginal revenue equals marginal cost.²⁹⁴ Since market prices are such that consumers are willing to pay for the product and producers are willing to supply the product, information on CRT costs, and in particular marginal costs, can be combined with information on demand to solve for the price that satisfies both sides of the market.

Although marginal cost plays an important role in analyzing firm pricing behavior, it is not directly observed and differs from costs reported in accounting data; accounting data must be adjusted to approximate economic cost.²⁹⁵ One of the prominent ways accounting costs differ from economic costs is in their treatment of capital: to an economist, the cost to a firm of using its productive capital to produce output is the value of the opportunity to sell the capacity foregone by retention of the capacity by the firm. In an industry characterized by declining demand and capacity in excess of current and expected future demand, productive capital will not fetch a good price if sold,²⁹⁶ so the cost of retaining and using productive capacity is low. Since the cost of using capacity is negligible, economic marginal cost is reasonably

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- Industry and firm-specific demand elasticities are estimated for the personal computer (PC) market using data on prices, technical attributes (e.g., hard disk capacity, processor speed), brand name, and shipment quantities. Stavins, Joanna, 1997, Estimating Demand Elasticities in a Differentiated Product Industry: The Personal Computer Market, *Journal of Economics and Business*, Vol. 49(4), 347-367.
 - The Almost Ideal Demand System (AIDS) “is perhaps the most commonly used differentiated product demand system” and the “relevant parameters of an AIDS specification are also quite easy to estimate and the estimation process requires data that are normally available to the analyst, namely prices and expenditure shares [which are calculated from prices and quantities]”. Davis, Peter, and Eliana Garces, 2010, *Quantitative Techniques for Competition and Antitrust Analysis*, Princeton University Press: Princeton, pp. 252-253.

²⁹³ If this condition did not hold, then firms would be able to increase profits by altering production. For example, if the revenue a firm would earn from producing one more unit is greater than the cost of producing that unit, then the firm could increase its profits by producing one more unit. Similarly, if the cost of producing one more unit is greater than revenue earned from selling one more unit, then a firm can increase its profits by producing less since that would reduce its costs by more than the loss in revenue. In contrast, when the revenue earned on the last unit sold equals the cost of producing that unit, a firm cannot increase its profits by altering its level of production.

²⁹⁴ Economists refer to incremental changes as marginal changes. That is, the revenue from producing one more unit is referred to as marginal revenue and the cost from producing one more unit is referred to as marginal cost.

²⁹⁵ “The basis for measuring economic damages should be economic profit, but analysts are often limited by available data and must use accounting data to estimate damages. Fortunately, accounting data often can be adjusted to produce an estimate of true lost economic profits.” American Bar Association, 2010, *Proving Antitrust Damages: Legal and Economic Issues*, Second Edition, ABA Publishing: Chicago, p. 99.

²⁹⁶ “In dying industries, the value of capital is permanently less than replacement cost.” Carlton, Dennis and Jeffery M. Perloff, 2005, *Modern Industrial Organization*, Fourth Edition, Addison-Wesley Longman, Inc., p. 249, footnote 4.

approximated by average variable costs calculated from accounting data. Section VI.C discusses evidence that the CRT industry was characterized by excess capacity and declining demand.

Accounting data (e.g., labor and materials costs) kept by firms in the regular course of business contain information useful for measuring average variable costs and from which estimates of marginal costs may be calculated. Section IX.1 describes available cost data that have thus far been obtained in the present case.

Alternatively, rather than directly estimating marginal costs, it is possible to use the economic relationship between price-cost margins and demand elasticity to recover marginal costs from data on prices and an estimate of the relevant demand elasticity. More formally, the Lerner index of market power establishes that a firm's price-cost margin is equal to the inverse of the magnitude of the elasticity of demand facing the firm.²⁹⁷ This formula can be solved so that marginal cost is determined by price and the elasticity of demand.²⁹⁸

c) Competitive interactions between cartel members

In addition to demand and cost influences, the degree of competition from other firms will impact the final price at which the transaction occurs. Simply put, market outcomes are impacted when firms collude rather than compete. By collectively reducing output, a cartel is able to increase the market price above what any of its individual members would be able to achieve by reducing its own output.²⁹⁹ As a result, by explicitly coordinating production and pricing

²⁹⁷ For a derivation of the Lerner index of market power and its relationship to the elasticity of demand facing the firm, see, e.g.,

- Landes, William M., and Richard A. Posner, March 1981, Market Power in Antitrust Cases, Harvard Law Review, Vol. 9(5), pp. 984-985.
- Carlton, Dennis W., and Jeffrey M. Perloff, 2005, Modern Industrial Organization, Fourth Edition, Person Addison Wesley, p. 92.

²⁹⁸ See, e.g.,

- “Alternatively, if demand elasticities are estimated and the oligopoly solution concept is known, one can back out estimates of marginal costs using the Lerner relationships.” Baker, Jonathan B., and Daniel L. Rubinfeld, 1999, Empirical Methods in Antitrust Litigation: Review and Critique, American Law and Economics Review, Vol. 1, No. 1, 386-435, p. 415, footnote 65.
- “With the estimated parameters of the demand function in hand, an assumption about firm conduct is sufficient to allow marginal costs to be recovered.” Peters, Craig, October 2006, Evaluating the Performance of Merger Simulation: Evidence from the U.S. Airline Industry, Journal of Law and Economics, Vol. 49(2), 627-649, p. 634.
- “One option is to estimate marginal cost curves directly from industry cost information if this is possible. However, sometimes, given the pricing equations, the market prices and demand parameters, marginal costs can be inferred.” Davis, Peter, and Eliana Garces, 2010, Quantitative Techniques for Competition and Antitrust Analysis, Princeton University Press: Princeton, p. 402.

²⁹⁹ See, e.g.,

- Carlton, Dennis W. and Jeffrey M. Perloff, 2005, Modern Industrial Organization, Fourth Edition, Person Addison Wesley, pp. 122-125.
- Baker, Jonathan B., and Timothy F. Bresnahan, June 1985, The Gains from Merger or Collusion in Product-Differentiated Industries, Journal of Industrial Economics, Vol. 33, Issue 4, A Symposium on Oligopoly, Competition and Welfare, 427-444, p. 428.

activities, each cartel member is able to gain from the increase in market price and earn higher profits than it could if it were to individually reduce output. The pricing model can be adjusted to reflect the but-for world by solving the profit-maximizing pricing decision at the level of the individual firm rather than as a solution to the profit-maximization problem solved by treating the cartel members as a single decision-making entity to reflect the fact that in the but-for world cartel members would not have been concerned with how their own behavior impacted the profits of rival firms.

A model of the CRT industry will be common across class members. The necessary inputs to the pricing model are demand and cost parameters, which can be estimated using evidence common to the class. That is, standard economic theory can be combined with common evidence to provide a formulaic measure of the but-for price.

4. Market power method: Measurement of overcharges based on a measure of market power

Instead of fully specifying a model of the industry to simulate the price that would have satisfied the demand and supply conditions of profit maximization to determine cartel members' but-for price, a fourth basis for quantifying the overcharge is to use the increase in market power that cartel members gained as a result of colluding as a basis for calculating the but-for price.³⁰⁰ Since a firm's market power is driven by the elasticity of demand it faces,³⁰¹ an estimate of the firm's but-for elasticity of demand can be compared with the demand elasticity faced by the firm when it is part of the cartel to obtain a measure of the market power gained as a result of collusion. The reduction in market power – as measured by the increased elasticity of demand faced by the firm absent collusion – can then be directly translated to a reduction in Defendant's price-cost margin using the Lerner index – that the elasticity of demand is the inverse of the price-cost margin. The change in the price-cost margin can be used to calculate the but-for price.

The elasticity of demand facing the cartel can be measured in a number of ways. The elasticity of demand of a firm (or a group of firms coordinating their behavior) can be calculated using the market share of the firm (or collection of colluding firms), the market level elasticity of demand, and the elasticity of supply of other firms.³⁰² Alternatively, using the relationship established by the Lerner index, the elasticity of demand faced by the firm can be backed out of the price-cost margin for the cartel using actual price and cost data.

Similarly, the but-for elasticity of demand, which can be used in the Lerner index to get an estimate of the but-for price, can be measured in a number of ways. First, the but-for elasticity could be obtained from the same Lerner index formula used to calculate the cartel demand elasticity except that the cartel market shares would be disaggregated into individual market

³⁰⁰ I use the term "market power" as it is generally used in antitrust economics, that is, I use market power to refer to "the ability of a firm (or group of firms, acting jointly) to raise price above the competitive level without losing so many sales so rapidly that the price increase is unprofitable and must be rescinded". Landes, William M. and Richard A. Posner, March 1981, Market Power in Antitrust Cases, Harvard Law Review, Vol. 9(5), p. 937.

³⁰¹ See Section IX.3.a).

³⁰² The formula used to relate the firm-level (or group of firms) elasticity of demand to the market demand, market share of the firm, and the elasticity of supply "has long been part of the industrial organization literature". Landes, William M., and Richard A. Posner, March 1981, Market Power in Antitrust Cases, Harvard Law Review, Vol. 9(5), pp. 945-946.

shares. Alternatively, individual price-cost margins could be calculated and converted into individual firm-level elasticities of demand.

Exhibit 13 and Section IX.3.a) detail the relevant sales and cost data that have been produced thus far.

The model for calculating Defendants' reduction in market power from behaving independently is common across class members as is the formula for translating the reduced market power into a reduced but-for price. This is another common formulaic method using common evidence that can be used to measure the but-for CRT price for each class member.

5. Summary: There exist multiple methods to measure overcharges to direct purchasers that are susceptible to common proof

Defendants' collusive behavior prevented the realization (and hence observation) of independently set prices. I have described a number of approaches common to class members that form reasonable bases for what CRT prices are likely to have been absent cartelization of the industry. Specifically, the economic determinants method implements a reduced-form price equation to estimate the impact on prices due to cartel members' collusive behavior using market-level demand and cost data and a measure of the market structure; the benchmark comparison method uses the profit rates of firms in industries facing similar demand and cost conditions as CRT manufacturers but free from collusive behavior as the basis for measuring Defendants' but-for prices; the simulation approach implements economic models of each of the primary components that affect market prices – demand functions, marginal cost, and the competitive environment – and integrates these models with real-world data from the CRT industry to predict the profit-maximizing price based on cartel members engaging in independent rather than collusive behavior; and the market power approach bases the but-for price on the reduction in margin that cartel members are likely to have faced to due to the reduced market power that would have resulted from independent rather than collusive behavior. All of these methods are implemented using common, market-level data.

B. Measurement of the pass-through of the antitrust overcharge to indirect purchasers is susceptible to common proof

In Section VIII.C, I established that at least some portion of the overcharge to direct purchasers was passed through to class members, which is sufficient to establish impact. In order to calculate damages to class members, I need an estimate of the magnitude of the overcharge that was passed through to class members. That is, I need to measure the extent to which changes in the price of CRTs translate into changes in the price for CRT monitors and TVs. Below I describe evidence (data) and a method to estimate the pass-through rate; both the evidence and the method are common to all class members.

The data used for these studies represent the prices at which CRTs and CRT products are bought and sold throughout the distribution channel. Ideally one would be able to isolate the change in price resulting from the cartel's behavior. This would require that prices rise on the first day of the cartel and fall on the last day of the cartel, while all else is held constant. These conditions, however, are not observable for a variety of reasons. One can, however, observe how firms respond to other cost changes, which provide a reasonable and conservative proxy for how they would respond to the cartel overcharges. The data I use to measure pass-through contain a variety of ordinary cost changes faced by CRT resellers. I include all the usable data that has

been provided to me, which includes both large and small cost changes. Similarly, some of these cost changes are perceived by resellers as temporary, while others are permanent. Finally, some of the cost changes I examine are borne by all resellers, while others are firm-specific. In contrast, the cartel overcharge imposed on all CRT resellers was significant, impacted all resellers, and was perceived as a permanent cost increase. Economic theory shows that industry-wide, non-transitory cost changes will be passed through, while temporary cost changes that do not impact all resellers are not necessarily passed-through. The data I employ for my studies, therefore, provide a conservative estimate of the pass-through rate.

1. Econometric design

I described in Section VIII.C.3 that the magnitude of the pass-through rate is at least 100% for any firm that applies the same mark-up to costs regardless of the level of costs. Not all firms set price using this strategy; therefore, it is necessary to measure pass-through empirically. The purpose of the pass-through analysis is to determine how prices change when costs change, which can be represented mathematically as the calculation of the partial derivative $\partial p/\partial c$, where “p” represents the price of the product and “c” represents the cost of the product. Regression analysis is a way to measure or calculate the pass-through rate.³⁰³ Economists routinely use regression analysis, inter alia, to calculate pass-through rates in a variety of industries.³⁰⁴

³⁰³ Regression analysis is an accepted and widely used tool in economics and the courts. See, e.g.,

- Rubinfeld, Daniel L., 2000, Reference Guide on Multiple Regression, in Federal Judicial Center, and National Research Council (Eds.), Reference Manual on Scientific Evidence, Third Edition, National Academies Press: Washington, D.C., 303-358.
<http://www.law.berkeley.edu/faculty/rubinfeld/Profile/publications.html>, accessed 15 May 2009.
- Davis, Peter, and Eliana Garces, 2010, Quantitative Techniques for Competition and Antitrust Analysis, Princeton University Press (Princeton, NJ: 2010) at pp. 368-375.

³⁰⁴ See, e.g., the following, which represents but a small portion of the pass-through studies reported in peer-reviewed, scholarly journals:

- Bachmeier, L.J. and J.M. Griffin, 2003, New Evidence on Asymmetric Gasoline Price Responses, Review of Economics and Statistics, Vol. 85(3).
- Bacon, R.W., 1991, Rockets and Feathers: the Asymmetric Speed of Adjustment of UK Retail Gasoline Prices to Cost Changes, Energy Economics, Vol. 13.
- Beetendorf, L., S.A. Van Der Geest, and M. Varkevisser, 2003, Price Asymmetries in the Dutch Gasoline Market, Energy Economics, Vol. 25.
- Besley, Timothy, and Harvey Rosen, June 1999, Sales Taxes and Prices: An Empirical Analysis, National Tax Journal, Vol. 52, pp. 157-178.
- Brownlee, Oswald, and George Perry, 1967, The Effects of the 1965 Federal Excise Tax Reduction on Prices, National Tax Journal, Vol. 20(3), pp. 235-249.
- Due, John F., December 1954, The Effect of the 1954 Reduction in Federal Excise Taxes on the List Prices of Electrical Appliances, National Tax Journal, Vol. 39, pp. 539-40.
- Harris, Jeffrey E., 1987, The 1983 Increase in the Federal Cigarette Excise Tax, in Tax Policy and the Economy, Vol. 1, Lawrence H. Summers, ed., MIT Press: Cambridge, pp. 87-112.
- Kirchgassner, G., and K. Kubler, 1992, Symmetric or Asymmetric Price Adjustments, Energy Economics, Vol. 14.

In order to estimate the pass-through rate for the entire distribution channel or any portion of it,³⁰⁵ I regress the price at the lowest point in the channel on the cost at the highest point in the channel.³⁰⁶ The coefficient on the upstream cost variable gives the pass-through rate. In this analysis, price and cost are the required variables to estimate the pass-through rate. However, there may be differences across some of the products (e.g., screen size) that also impact the price level. Therefore, whenever the data permit, I include variables to control for these different product characteristics as well. Appendix B provides a detailed description of the econometric methods used in the pass-through studies summarized below.

2. Summary of econometric estimates of pass-through

I conduct 40 empirical pass-through studies and, whenever possible, I calculate pass-through rates by application; that is, I calculate separate rates for tubes, monitors, and TVs. I use data produced by Defendants as well as third parties; some of these data are transaction-level data, meaning they represent the actual amount paid by the purchaser, while some of these data are price lists or price guidelines from which actual transaction prices are derived.

It is neither feasible nor necessary to measure pass-through for each individual firm in the distribution channel for several reasons. There are many firms that participate in the production and distribution of CRT products, and not all of them maintain the data necessary to measure pass-through. Many of these resellers are located outside the U.S. and I understand are not obligated to respond to Plaintiffs' subpoenas requesting data. Some resellers no longer exist, nor do data on their past sales. Even if these data did exist and were readily available, it would not be necessary or practical to measure pass-through for each and every firm; instead, one can accurately measure pass-through by obtaining a representative sample of all the firms in the distribution channel, which is the approach that I use. Plaintiffs' counsel has, with my input, subpoenaed a range of different types of firms (e.g., "big box" stores, online retailers) operating at all levels of the distribution channel (e.g., product manufacturers, retailers), selling all types of at-issue CRT products. Using these third-party data produced in response to Plaintiffs' subpoenas, as well as other data produced by Defendants, I have completed a considerable number of pass-through studies using data that represent the pricing decisions made by the various types of CRT resellers operating throughout the distribution channel. Discovery is ongoing and I reserve the right to supplement my analysis as new data becomes available.

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- Poterba, Jim, 1996, Retail Price Reactions to Changes in State and Local Sales Taxes, *National Tax Journal*, Vol. 49(2), pp. 165-176.
 - Sidhu, Nancy D., The Effects of Changes in Sales Tax Rates on Retail Prices, in *Proceedings of the Sixty-Fourth Annual Conference on Taxation*, National Tax Association-Tax Institute of America: Columbus, pp. 720-733.
 - Woodard, F.O., and Harvey Siegelman, 1967, Effects of the 1965 Excise Tax Reduction upon the Prices of Automotive Replacement Parts, *National Tax Journal*, Vol. 20(3), pp. 250-258.

³⁰⁵ This approach may be applied to data spanning the entire distribution channel using the cost of CRTs at the top of the channel matched with CRT finished goods retail prices at the bottom of the channel. Alternately, this same approach can be applied to any individual level in the distribution channel. In the former approach, the pass-through rate for the entire channel is calculated directly; in the latter approach, the pass-through rate over the entire distribution channel is the product of the pass-through rates for each portion of the distribution channel.

³⁰⁶ As stated above, regression analysis is a widely accepted tool of economics that has also been widely accepted by the courts. See footnote 304.

a) Wal-Mart

I have completed three pass-through studies for sales of CRT products at Wal-Mart stores. These studies are informative not only of the pass-through rate for Wal-Mart, but also of the various types of data that can be used to calculate pass-through. The datasets I use all contain sales of CRT products through Wal-Mart stores: two of these datasets were produced by Wal-Mart³⁰⁷ and one was produced by Sanyo. These files include slightly different cost and price variables, all of which provide useful information pertaining to Wal-Mart's pricing practices and for measuring Wal-Mart's pass-through rate. Using these three datasets, which capture slightly different measures of costs and prices for Wal-Mart, I calculate pass-through rates that are very consistent across the different data.

The Wal-Mart studies show that various types of price and cost data can be used to measure pass-through. These studies provide examples of how cost and price data from different sources can be combined. In some data sets the cost and price variables are already matched; that is, for each observation both a cost and price are recorded. For other data, it is necessary to match the appropriate cost with the appropriate price for each observation. Although this matching is not always possible, the studies below illustrate that when the matching is done appropriately, one can obtain usable data to measure pass-through.

The files that are used for these studies, which were provided by Wal-Mart, include actual transaction-level cost and prices as well as Wal-Mart's suggested retail prices. I also use price lists provided by Sanyo for sales of CRT products to Wal-Mart. Transaction-level data record the actual amount paid by purchasers, but these data often include extraneous information that may not accurately represent the price of an item for some transactions.³⁰⁸ Price lists or suggested retail prices may not reflect the actual amount a customer paid for an item, but they do provide a starting point for any price negotiations, discounts, etc., all of which are informative of a seller's pricing practices. Whereas some argue that only certain types of data can be used to measure pass-through, these studies prove otherwise: individually, each of these studies provides a reliable estimate of the pass-through rate for Wal-Mart; collectively they yield a set of consistent results that validate the use of the various different types of data available.

In the first study, I use TV purchasing data produced by Wal-Mart. These data include Wal-Mart's actual weekly cost for each item,³⁰⁹ and a "Retail Amount" variable, which appears to be

³⁰⁷ Wal-Mart also produced data for sales through Sam's Club. I completed studies using the Sam's Club data, which are reported in Section IX.B.2.b); the results of the Sam's Club studies are consistent with the Wal-Mart study results.

³⁰⁸ For example, a retail customer may have store credit which may be applied to the purchase price of an item. Also, it is not uncommon to observe a sales prices of one cent in transaction-level data for various reasons (e.g., exchanges for defective products) but these transaction amounts are not indicative of the actual price of the item. There are many other scenarios which may distort the price recorded in these transaction level of a product in these data

³⁰⁹ See, e.g.,

- Wal-Mart produced weekly purchase data beginning on 11 October 2008 and ending on 13 August 2010. Fields include the year-week, the week's beginning and ending date, item number, item description, UPC, UPC description, vendor name and number, the gross purchase quantity, the gross purchase cost, and the gross retail (price) amount. Wal-Mart, 2010, Walmart and Sams Select Gross Ships Report 102008-102010, <<Walmart and Sams Select Gross Ships Report 102008-102010 LR35847.xls>>.
- Wal-Mart produced additional weekly purchase data beginning in the 21st week of 2001 and ending in the 34th week of 2008; these data were disaggregated by store. Fields include the store number, vendor name

the suggested retail price for each item.³¹⁰ The data are in a form in which the cost and price variables are already matched. I regress the suggested price on the actual cost for the TV, controlling for size and other features (brand, wide screen, and TV-VCR combo). Using these data, I calculate a 110% pass-through rate. The interpretation of these results is that when Wal-Mart's cost for TVs increases by \$1.00, the price Wal-Mart charges its customers increases by \$1.10.

In the second study, I use the same purchasing cost data described above, but I match these actual costs to the daily sales data produced by Wal-Mart; that is, I use price data based on actual store-level transactions.³¹¹ In order to combine these data, I calculate average weekly per-unit price for each product for all stores, which I then match with the average weekly per-unit cost for each product. As before, I regress the price on the cost for each item, controlling for size and other features (brand, wide screen, and TV-VCR combo). Using these data, I calculate a 106% pass-through rate. The interpretation of these results is that when Wal-Mart's cost for TVs increases by \$1.00, the price Wal-Mart charges its customers increases by \$1.06.

In the third study, I use yearly price lists provided by Sanyo for TVs sold from Sanyo Manufacturing Corporation to Wal-Mart between 1995 and 2007.³¹² These data include a "FOB Cost" variable which represents Wal-Mart's cost to purchase products from Sanyo; these costs are already matched to the Wal-Mart suggested retail price. I regress Wal-Mart's suggested retail price on Wal-Mart's FOB Cost controlling for the size of the TV and other features (flat screen, wide screen, HDTV, and picture-in-picture). Using these data, I calculate a 112% pass-through rate. The interpretation of these results is that when Wal-Mart's cost for TVs increases by \$1.00, the price Wal-Mart charges its customers increases by \$1.12.

Each of these studies uses slightly different data representing the cost and price at which Wal-Mart purchases and sells CRT products; however, these data all represent the pricing behavior of Wal-Mart. Analyzing these various data sources indicates that Wal-Mart passes through cost increases to its customers at a common rate over 100%. This conclusion holds whether one examines data including suggested retail prices, wholesale list prices, or actual transaction data.

b) Other studies

and number, item description, item number, year-week variable, per-unit retail (price) amount, per-unit purchase cost, and purchase quantity. Wal-Mart, 2010, Sams and WMT Selected Gross Ships Report LR35989, <<Sams and WMT Selected Gross Ships Report LR35989 (1).xls>>.

³¹⁰ I have requested that Wal-Mart confirm this interpretation of the data.

³¹¹ Wal-Mart produced daily sales data for selected stores beginning on 14 January 1995 and ending on 6 October 2010. Fields include the date, the store number, the item number, item description, UPC, UPC description, vendor name and number, sales quantity, and sales amount in dollars. Wal-Mart, 2010, Walmart and Sams Selected Sales Report, <<Walmart and Sams Selected CRT Sales Report LR35846.xls>>.

³¹² This file contains prices and costs for Sanyo televisions sold through Wal-Mart. There is a separate price list for each year, beginning in 1995 and ending in 2007. Generally, each year contains Wal-Mart's model number, the suggested retail price at which Wal-Mart lists the product, the percent mark-up, Wal-Mart's FOB costs, an "effective date" on which price changes take effect, and a column for notes and comments about the price change. Some pages also contain a Wal-Mart item number (Wal-Mart's in-house SKU), and a group description that specifies the size of the TV as well as some other characteristics. Sanyo, 04 March 2011, CRT Pricing Info (1995-2007), <<CRT Pricing Info (1995-2007).PDF>>.

In addition to the Wal-Mart studies discussed above, I have conducted additional 37 pass-through studies, which fall into two general categories: those that measure pass-through over the entire distribution channel and those that measure pass-through for an individual level of distribution.

As described in Section VIII.C, there are two approaches for estimating pass-through over the entire channel: by looking at the relationship between costs at the top of the distribution chain and prices at the bottom of the distribution chain and by estimating the pass-through rate at each level of distribution chain and then multiplying them. I refer to the empirical implementation of these concepts the top-and-bottom approach and the top-to-bottom approach, respectively. Both of these approaches are implemented by using the same data, i.e., CRT prices, for the top of the channel; however, different data are used for the bottom of the channel. The top-and-bottom approach uses retail or “street” prices for products being sold to end-users as the downstream price.^{313,314} The top-to-bottom approach incorporates data from multiple levels of the channel including as many intermediate resellers as necessary to trace specific products through the entire distribution chain from the CRT manufacturer to the end customer.³¹⁵

I have conducted one top-and-bottom study and one top-to-bottom study. The top-and-bottom study uses Defendant costs from sales of CRT tubes at the top of the channel matched to retail

³¹³ The top-and-bottom approach does not use data from any intermediate resellers. Rather, the pass-through rates of intermediate resellers are subsumed within the analysis. This approach estimates a single pass-through coefficient for the entire distribution channel.

³¹⁴ Estimating the pass-through rate for an entire distribution chain by looking at the prices at the top and bottom of the distribution chain is common in the peer-reviewed, published, scholarly economic literature. See, e.g.,

- Aaronson, Daniel, February 2001, Price Pass-through and the Minimum Wage, *The Review of Economics and Statistics*, Vol. 83(1), pp. 158-169.
- Gron, Anne, and Deborah Swenson, May 2000, Cost Pass-Through in the U.S. Automobile Market, *The Review of Economics and Statistics*, Vol. 82(2), pp. 316-324.
- Kadiyali, Virinda, 1997, Exchange Rate Pass-through for Strategic Pricing and Advertising: An Empirical Analysis of the U.S. Photographic Film Industry, *Journal of International Economics*, Vol. 43, pp. 437-461.
- Karp, Larry S., and Jeffrey M. Perloff, March 1989, Estimating Market Structure and Tax Incidence: The Japanese Television Market, *The Journal of Industrial Economics*, Vol. 37(3), pp. 225- 239.
- Leibtag, Ephraim, Nakamura, Alice, et al., March 2007, Cost Pass-Through in the U.S. Coffee Industry, United States Department of Agriculture Economic Research Service Economic Research Report Number 38.
- Nakamura, Emi, and Dawit Zerom, August 2009, Accounting for Incomplete Pass-Through, NBER Working Paper 15255, <http://www.nber.org/papers/w15255>.
- Radchenko, Stanislav, 2005, Lags in the Response of Gasoline Prices to Changes in Crude Oil Prices: The Role of Short-Term and Long-Term Shocks, *Energy Economics*, Vol. 27, 573-602.
- Sumner, Daniel A., October 1981, Measurement of Monopoly Behavior: An Application to the Cigarette Industry, *The Journal of Political Economy*, Vol. 89(5), 1010-1019.

³¹⁵ This approach requires being able to identify the customers in each dataset as well as trace the specific products across datasets, preferably by manufacturer part number and date. This approach estimates multiple pass-through coefficients—one for each level of the distribution channel represented in the data. The product of each of these pass-through coefficients gives the pass-through rate for the entire channel.

prices of CRT finished goods reported by DisplaySearch at the bottom of the channel.³¹⁶ Using the top-and-bottom approach, I calculate a pass-through rate of 127%, which spans the entire distribution channel. The top-to-bottom study uses data that traces sales of CRTs through the following resellers: TAEC, TACP, and Costco.³¹⁷ Using the top-to-bottom approach, I calculate a pass-through rate of 102%, which also spans the entire distribution channel; see Exhibit 33.

The second general category of studies includes those that calculate pass-through for a single level in the distribution channel. Because the data for these studies only spans one level of distribution, I estimate a single pass-through coefficient for each level in the distribution channel. I have conducted two pass-through studies using data provided by CRT distributors, five studies using data provided by CRT product makers, four studies using data provided by CRT product distributors, twenty seven pass-through studies using data provided by CRT product resellers (twelve of these studies are for brick and mortar retailers and fifteen are for online retailers).³¹⁸

³¹⁶ I have also identified data that may be usable for additional top-and-bottom pass-through studies: at the top of the channel I can either use costs from Defendants' sales of CRT tubes or I can use costs from CRT tube sales reported by market research firms. See, e.g.,

- DisplaySearch, Undated, Quarterly CRT TV Cost & Price Forecast Model Report, SDCRT-0002412.
- DisplaySearch, July 2006, Quarterly CRT TV Cost & Price Forecast Model Report, SDCRT-0002413.
- DisplaySearch, Undated, Quarterly CRT TV Cost & Price Forecast Model Report, SDCRT-0002414.
- DisplaySearch, April 2008, Quarterly CRT TV Cost & Price Forecast Model Report, Q1'08 History with Q2'08-Q4'12 Forecasts, SDCRT-0002415.
- DisplaySearch, April 2008, Quarterly CRT TV Cost & Price Forecast Model Report, Q1'08 History with Q2'08-Q4'12 Forecasts, SDCRT-0002416.

There are multiple files which report street prices for CRT finished products at the bottom of the channel. See, e.g.,

- Witsview, February 2007, Monthly Major Region Street Price Book, LGE00082760.
- Witsview, January 2007, Monthly Major Region Street Price Book, LGE00082762.
- Witsview, April 2007, Monthly Major Region Street Price Book, LGE00082765.
- Chunghwa Picture Tubes, LTD, 20 September 2005, TV Price Summary, CHU00303245.
- Undated, Retail - 1080i TV, CHU00331635.

³¹⁷ The data used for the tube distributor portion of this study, sales from Toshiba to TAEC, does not include sufficient information to control for product characteristics. In order to complete this study, I control for individual part numbers. It may be possible to gather product attributes for these products from other sources; if so, I will update my analysis accordingly. It also may be possible to extend this study to include additional retailers at the bottom of the channel, including Best Buy, Fry's, and Sam's Club.

³¹⁸ See, e.g.,

- Tube distributors: Toshiba America Electronics Corporation (TAEC).
- CRT product makers:
 - BenQ, Tatung, and Toshiba America Information Systems (TAIS) are monitor makers that provided data.
 - Funai and Toshiba America Consumer Products (TACP) are TV makers that provided data.
- CRT product distributors: Arrow Electronics, Ingram Micro, and Tech Data.
- CRT product resellers:

Exhibit 34 lists the calculated pass-through rates and other statistical results for each of the studies I have conducted to date. Exhibit 35 provides information about the firms, the data they provided, and the specification for each of the studies I have conducted to date. Exhibit 36 lists the files relied upon for each pass-through study.

Exhibits 37-39 plot the calculated pass-through rate and corresponding 95% confidence interval for each of the studies.³¹⁹ All of the confidence intervals either include 100% or are wholly above 100%. The 30 studies with confidence intervals wholly above 100% are the studies that find a pass-through rate that is statistically significantly greater than 100%. For these studies, because the value 100% is excluded from the confidence interval, I conclude that, with 95% confidence, the pass-through rate is not 100%; specifically, I conclude that it is greater than 100%. The remaining 10 studies with confidence intervals that include 100% are the studies that result in pass-through rates that are not statistically significantly different from 100%. None of the confidence intervals are wholly below 100%, meaning none of the studies result in a pass-through rate that is statistically significantly less than 100%.

3. Channel coverage

I have conducted studies for all of levels of the distribution channel as described in Section VI.D. Exhibit 40 summarizes which segments of the distribution channel are covered with each study. I present two studies that measure pass-through from Defendants selling CRTs at the top of the channel to end customers purchasing CRT products at the bottom of the channel; I present 26 studies that measure pass-through for part of the distribution channel. Collectively, these studies cover the entire distribution channel and portions of the distribution channel, include both types of at-issue CRT products, and represent all the various types of buyers and resellers operating in the distribution channel. The total number of CRTs represented in these datasets is over 76million. These datasets include transactions beginning as early as February 1994 and continuing into November 2011. Exhibits 41-43 summarize the time periods covered by each study.

4. Summary: The pass-through rate is at least 100%

Based on the documentary evidence and the findings of the econometric studies, I conclude that any overcharges were passed through to consumers at a common rate of at least 100%. Of those studies, 30 of 40 found a pass-through rate statistically greater than 100% and 10 of 40 were not statistically significantly different from 100%.

These results verify that the pass-through rate can be quantified by common evidence and methods, and that all class members suffer common harm in the amount of at least 100% of the overcharge imposed by Defendants at the top of the distribution chain.

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- Brick-and-mortar retailers: Best Buy, Costco, Fry's, Office Max, Sam's Club, and Wal-Mart are brick-and-mortar retailers that provided data. These brick-and-mortar stores all have an online presence as well.
 - Online retailers: Amazon, Buy.com, CDW, Dell, Gateway, PC Connection, PC Mall, and Zones.

³¹⁹ A 95% confidence interval is a range that is expected to contain the actual value of interest (in this case, the pass-through rate) 95% of the time the range is estimated. Wooldridge, Jeffrey M., 2000, Introductory Econometrics: A Modern Approach, South-Western College Publishing, p. 134.

C. Class-wide damages can be calculated using a common formulaic method

A measure of class-wide damages can be obtained by determining the portion of Defendants' revenues from at-issue products that is attributable to the cartel overcharge in passed down the distribution chain to class members. The calculation to do so is a straight-forward application of the overcharge to direct purchasers and pass-through rates to class members. Specifically, class-wide damages can be calculated as the product of Defendants' revenues from at-issue products, the overcharge rate, and the pass-through rate.

To calculate total revenues, I first would calculate the quantity of tubes manufactured by Defendants and conspirators that the class members purchased, by year and product type. I then could calculate weighted average prices of CPTs and CDTs by year. Defendants' revenue by year and product type would be the product of weighted average price and quantity.

1. Shipments of CRT tubes

To determine the revenue Defendants received from class members' indirect purchases of at-issue products during the class period, March 1, 1995 through November 25 2007,³²⁰ I would begin by calculating the shipments of CRT tubes that are used in the products at-issue – monitors and TVs.

Currently, data produced by Defendants are insufficient to calculate Defendants' worldwide shipments for at-issue products. Many Defendants have produced no CRT tube sales data³²¹ and some of the data produced have gaps.³²² Therefore, I would use data from Defendants and third parties to calculate shipments made to the class, such as DisplaySearch. See Exhibit 44.

Calculating the Defendants' sales to class members during the class period begins with determining total worldwide shipments of CDTs and CPTs.³²³ I would next calculate the

³²⁰ Complaint, ¶1.

³²¹ LG, LG Philips, Thomson/Videocon, Mitsubishi, Orion, IRICO, Samtel, and Thai-CRT did not produce CRT tubes sales data.

³²² Defendants that have not produced data for certain subsidiaries include Hitachi Singapore (HEDS) and Hitachi Malaysia (HEDM). In addition, defendants have produced data that contain gaps or significant periods of missing data. For example, HEDUS's data is missing data from 1995 – 1997.

³²³ See,

Worldwide Shipments of CPT:

- Hitachi Displays, 2002, Untitled Spreadsheet, HDP-CRT00019322.
- MT Picture Display, November 2006, Untitled Spreadsheet, MTPD-0416090 at Tab 'Supply DB'.

Worldwide Shipments of CDTs:

- Hitachi Displays, 2002, Untitled Spreadsheet, HDP-CRT00019322.
- DisplaySearch, 2003, DisplaySearch Quarterly Desktop Monitor Shipment and Forecast Report Q1'03, CHWA00106460 - CHWA00106757.
- DisplaySearch, 2003, Quarterly Desktop Monitor Shipment and Forecast Report, CHWA00062147 - CHWA00062569.
- DisplaySearch, 07 July 2005, Q2'05 Quarterly Desktop Monitor Shipment and Forecast Report, CHWA00088192 - CHWA00088762.

defendants' share of total shipments. To calculate the share of worldwide CRT production ultimately consumed in North America, I use data on consumption of CRT monitors and TVs because CRT are consumed in North America in CRT products. The DisplaySearch Custom Data Project breaks shipments of monitors and TVs down by region, including North America, for 1999 - 2010 and 2004-2010, respectively.³²⁴ This would give North America's consumption share of Defendants' worldwide CPT and CDT production. The total North America consumption could be calculated by multiplying the North America share by the Defendants' worldwide shipment for that year.

I would exclude those CRT tubes sold into Canada and Mexico by assuming that North American consumers purchase CRT products in proportion to each country's gross domestic product (GDP); thus, I would multiply the North American units by the U.S. share of the combined U.S., Mexican, and Canadian GDP to obtain the total U.S. shipments.

2. Eliminate government purchases

Government entities are not a part of the class; therefore, I would exclude those U.S. shipments that are derived from government purchases.³²⁵ To calculate the share of shipments resulting from government purchases, I would use data on the breakdown of computer sales between government entities and private consumers, which are provided by the U.S. Bureau of Economic Analysis (BEA, part of the Department of Commerce).³²⁶ Using the BEA data results in a conservative estimate of class shipments for televisions because the government share of television purchases is likely to be smaller than the government shares of monitor purchases.

3. Class member shipments

Only residents living in certain states are part of the Indirect Purchaser State Classes.³²⁷ I assume that CRT end-product sales are distributed across states according to population. To calculate the number of CPT and CDT purchased by class members, I would multiply each year's total, non-

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- DisplaySearch, 30 September 2005, Q3'05 Quarterly Desktop Monitor Shipment and Forecast Report, CHU00281352 - CHU00281923.
 - DisplaySearch, 30 March 2007, Q1'07 Quarterly Desktop Monitor Shipment and Forecast Report, CHU00154037 - CHU00154420.
 - DisplaySearch, 28 September 2007, Q3'07 Quarterly Desktop Monitor Shipment and Forecast Report, LGE00076321 - LGE00076707.
 - Samsung, 11 December 2003, Worldwide CDT Manufacturer's Status, SDCRT-0201291.
 - Undated, CDT maker sales, CHU00071226.

³²⁴ The data begin at 1999 for monitors and 2004 for TVs. For years prior to 1999 for CDTs and 2004 for CPTs, I will assume that the North America share was stable at the 1999 and 2004 North America share, respectively. See,

- DisplaySearch, May 2011, Analysis Group, Inc. Custom Data Project, DISP_LCD_000128.
- DisplaySearch, May 2011, Analysis Group, Inc. Custom Data Project, DISP_LCD_000129.

³²⁵ Complaint, ¶232.

³²⁶ Bureau of Economic Analysis, 20 August 2012, Final Sales of Domestic Computers, <http://www.bea.gov/national/xls/comp-gdp.XLS>, accessed 20 September 2012.

³²⁷ Complaint, ¶234.

government, U.S. shipments by the population share of the states that are included in the class.³²⁸ That is, I would allocate the total non-governmental U.S. shipments to class states based on population shares.

4. Average weighted price by period and application

Using data produced by Defendants,³²⁹ I could generate quarterly CPT and CDT prices.^{330,331} The total U.S. shipments for each year and application would be multiplied by the average price resulting in the total U.S. revenues for that year. For example, if only 14" and 15" CDTs were produced, to calculate weighted average price:

$$(\text{percent}_1 * \text{price}_1) + (\text{percent}_2 * \text{price}_2) = \text{weighted average price}$$

where percent_1 is the percent of U.S. tube sales that were 14" CDTs and percent_2 is of U.S. tube sales that were 15" CDTs. Then price_1 is the average price of 14" CDTs and price_2 is the average price of 15" CDT in 1999. The result is the weighted average price for 1999.

5. Defendant revenue from sales to class members

To generate total Defendant and Co-conspirator revenues from (indirect) tube purchases by class members, I would multiply the average price by the class member units purchased for each year and sum across all years to get total revenues from class members' purchases.

6. Arithmetic

Damages to class members, for each product at-issue and for each year, are then the product of revenues from class members for each product at-issue and for each year, multiplied by the appropriate overcharge rate, and multiplied by the appropriate pass-through rate.

X. Summary of conclusions

After analyzing the relevant facts, I conclude that, if Defendants engaged in the alleged price fixing conduct, the CRT cartel was effective at increasing prices in a common manner to direct purchasers. Pass-through of the overcharges to direct purchasers occurred on a common basis, leading to a common impact on class members. That is, class members paid a higher price for CRT monitors and TVs as a result of the cartel's conduct.

³²⁸ Arizona, California, District of Columbia, Florida, Hawaii, Iowa, Kansas, Maine, Michigan, Minnesota, Mississippi, Nebraska, Nevada, New Mexico, New York, North Carolina, North Dakota, South Dakota, Tennessee, Vermont, West Virginia, and Wisconsin. Dakota, Tennessee, Vermont, West Virginia, and Wisconsin. 11 December 2010, Indirect Purchaser Plaintiffs' Third Consolidated Amended Complaint, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division) (Hereinafter "Third Consolidated Amended Complaint"), ¶233.

³²⁹ See Exhibit 13.

³³⁰ To calculate weighted average price for each year, I would multiply the average price for a given size by the number of units sold for that size divided by the total units sold that year. Summing the results across all sizes provides the weighted average selling price for that year and application.

³³¹ See, e.g.,

- Samsung, 11 December 2003, Worldwide CDT Manufacturer's Status, SDCRT-0201291.
- DisplaySearch, May 2011, Analysis Group, Inc. Custom Data Project, DISP_LCD_000128.
- DisplaySearch, May 2011, Analysis Group, Inc. Custom Data Project, DISP_LCD_000129.

I describe methods that can be used to calculate the overcharge to direct purchasers on a common, formulaic basis, and I describe a common method to calculate the pass-through rate of CRT price increases on CRT product prices as well as present illustrative pass-through studies. Given the feasibility of calculating the overcharge and estimating pass-through, I conclude that damages to class members can be calculated using common evidence on a common, formulaic basis.

The analyses performed are applicable to all class members, no matter in which state the class member resides, no matter in what time period the CRT product was purchased, no matter from whom the product was purchased, and no matter whether the purchase was a TV or monitor. The analyses are based on common evidence.

XI. Appendix A: Brief description of defendants

A. Chunghwa companies

Chunghwa Picture Tubes (“Chunghwa”) is a Taiwanese manufacturer of display products³³² and a subsidiary of Tatung.³³³ Chunghwa produced CRTs at facilities in Taiwan, China, Malaysia, and the UK³³⁴ and had technical cooperation agreements with Tokyo Toshiba, Mitsubishi, and Hitachi.³³⁵ The company’s large customers included Samsung Electronics, TPV Technology (AOC), XOCOCO, Innolux Display, Tatung, and Sony.³³⁶

B. Daewoo companies

The Daewoo Group (“Daewoo”) manufactured CRTs through Orion Electric (“Orion”) at facilities in South Korea, France, Vietnam, and Mexico.³³⁷ Orion became a Daewoo company in 1983³³⁸ and was one of a handful of companies retained by Daewoo³³⁹ after the conglomerate

³³² Chunghwa Picture Tubes, LTD, 14 March 2003, Chunghwa Picture Tubes, Ltd. and Subsidiaries Consolidated Financial Statements For The Years Ended December 31, 2002 and 2001 with Report of Independent Auditors, CHU00000207 - CHU00000259 at 0214.

³³³ Chunghwa Picture Tubes, LTD, 14 March 2003, Chunghwa Picture Tubes, Ltd. and Subsidiaries Consolidated Financial Statements For The Years Ended December 31, 2002 and 2001 with Report of Independent Auditors, CHU00000207 - CHU00000259 at 0245.

³³⁴ Exhibit 3

³³⁵ Chunghwa Picture Tubes, LTD, 14 March 2003, Chunghwa Picture Tubes, Ltd. and Subsidiaries Consolidated Financial Statements For The Years Ended December 31, 2002 and 2001 with Report of Independent Auditors, CHU00000207 - CHU00000259 at 0243.

³³⁶ Chunghwa Picture Tubes, LTD, 23 July 2009, Important Notice to Existing Shareholders of Chunghwa Picture Tubes, LTD., <http://www.CPT.tw/cpt/chinese/backend/files/Important%20Notice.pdf>, accessed 08 August 2012, p. 98.

³³⁷ Exhibit 3

³³⁸ Deflection Unit, 04 May 2004, Orion Electric Gets Interest, The Daily Deal, <http://www.accessmylibrary.com/article-1G1-116222742/orion-electric-gets-interest.html>, accessed 21 August 2012, p. 1.

³³⁹ The Japanese Research Institute, United, June 1999, RIM, June 1999, No. 44, <http://www.jri.co.jp/MediaLibrary/file/english/periodical/rim/2012/44.pdf>, accessed 17 August 2012, p. 9.

was forced to restructure in 1999.³⁴⁰ Orion was spun off from Daewoo in the early 2000's,³⁴¹ entered court receivership in 2003,³⁴² and was acquired by a U.S. investment fund in 2005.³⁴³

C. Hitachi companies

Hitachi is a Japanese conglomerate which produced CRTs at facilities in Japan, China, Malaysia, Singapore and the U.S.³⁴⁴ Hitachi's CRT production was organized under the Electron Tube & Devices Division for much of the class period and beginning in 1998 this division was part of the Electronics Components Group.³⁴⁵ In 2002, the company's display group was spun off to a new company named Hitachi Displays. By 2007, Hitachi was no longer producing CRTs.³⁴⁶

D. IRICO companies

The IRICO Group Corporation ("IRICO"), also known as Caihong,³⁴⁷ is a Chinese state-owned enterprise which produces CPTs, CRT components, and other display products. IRICO was founded in 1989 as a parent company for CRT operations³⁴⁸ which had begun as early as 1977 at a facility in Shaanxi, China.³⁴⁹ IRICO produces CPTs and CRT components through a network of Chinese subsidiaries, including IRICO Display Devices. IRICO owns several of its subsidiaries indirectly through an intermediate company named IRICO Group Electronics.³⁵⁰ IRICO's major customers included TCL, Skyworth, Konka, Changhong, and Hisense – all Chinese television producers.³⁵¹

³⁴⁰ Nam In-soo, 18 August 1999, Daewoo Foreign Bankers Form Debt Talks Panel, PHLP-CRT-081989 - PHLP-CRT-081992 at 1989.

³⁴¹ Deflection Unit, 04 May 2004, Orion Electric Gets Interest, The Daily Deal, <http://www.accessmylibrary.com/article-1G1-116222742/orion-electric-gets-interest.html>, accessed 21 August 2012, p. 1.

³⁴² Deflection Unit, 04 May 2004, Orion Electric Gets Interest, The Daily Deal, <http://www.accessmylibrary.com/article-1G1-116222742/orion-electric-gets-interest.html>, accessed 21 August 2012, p. 1.

³⁴³ 22 February 2005, Orion Electric Sold to U.S. Fund Matlin Patterson, Asia Africa Intelligence Wire, http://www.accessmylibrary.com/coms2/summary_0286-18874308_ITM, accessed 17 August 2012, p. 1.

³⁴⁴ Exhibit 3

³⁴⁵ 09 December 2009, Project Mercury, EIN0001646 - EIN0002100 at 1702.

³⁴⁶ Exhibit 3

³⁴⁷ Lisa Li, 07 December 2000, Re: the inquiry from Caihong, HEDUS-CRT00163723 - HEDUS-CRT00163724 at 3723.

³⁴⁸ IRICO Group Corporation, 2009, Corporate Events, <http://www.ch.com.cn/english/txt.jsp?urltype=tree.TreeTempUrl&wbtreeid=1466>, accessed 22 August 2012, p. 1.

³⁴⁹ 2009, About IRICO, <http://www.ch.com.cn/english/txt.jsp?urltype=tree.TreeTempUrl&wbtreeid=1459>, accessed 21 August 2012, p. 3.

³⁵⁰ IRICO Group Electronics, 2004, IRICO Group Electronics Company Limited, <http://quote.morningstar.com/stock-filing/Annual-Report/2004/12/31/t.aspx?t=XHKG:00438&ft=&d=b0c4c2a0ff0cfc9f>, accessed 07 August 2012, p. 82.

³⁵¹ IRICO Group Electronics, 2004, IRICO Group Electronics Company Limited, <http://quote.morningstar.com/stock-filing/Annual-Report/2004/12/31/t.aspx?t=XHKG:00438&ft=&d=b0c4c2a0ff0cfc9f>, accessed 07 August 2012, p. 3.

E. LP Displays companies

LP Displays was founded in 2001 as a 50/50 joint venture between LG Electronics and Philips.³⁵² Both companies transferred their CRT activities to the new company at this time. LP Displays produced CRTs and components through its subsidiaries and joint ventures in Europe (the Netherlands, France, Germany, the UK, the Czech Republic, Slovakia, and Poland), Asia (China, South Korea, and Indonesia), and the Americas (Brazil, Mexico, and the U.S.).³⁵³ In 2006, two major LP Displays holding companies declared bankruptcy,³⁵⁴ and over the next few years several other LP Displays companies underwent bankruptcy, liquidation, or sale.³⁵⁵ The company's name was changed from LG.Philips Displays to LP Displays in 2007.³⁵⁶

LG Electronics ("LGE") is a Korean manufacturer of consumer electronics. Prior to the formation of LP Displays, LGE manufactured CRTs at facilities in China, Indonesia, Mexico, South Korea, the UK, and the U.S. See Exhibit 3. LGE purchased a majority share of Zenith, an American producer of CRTs and televisions, in 1995.³⁵⁷

Philips, a Dutch company, also produced consumer electronics. Prior to 2001, a Philips subsidiary named Philips Display Components managed the manufacture of CRTs and finished products for Philips.³⁵⁸ In December 2005, Philips wrote off the remaining value of its investment in LP Displays³⁵⁹ and announced that it would not inject further capital into the joint

³⁵² A.A.M. Deterink, 01 March 2006, Trustee's First Report in the bankruptcy of LG.Philips Displays Holding B.V. and LG.Philips Displays Netherlands B.V., <http://deterinklive.com/nl/publicaties/faillissementsverslagen/l/>, accessed 12 July 2012, p. 6.

³⁵³ A.A.M. Deterink, 01 March 2006, Trustee's First Report in the bankruptcy of LG.Philips Displays Holding B.V. and LG.Philips Displays Netherlands B.V., <http://deterinklive.com/nl/publicaties/faillissementsverslagen/l/>, accessed 12 July 2012, p. 7.

³⁵⁴ 02 February 2006, LG.Philips Displays files for bankruptcy protection, EE Times Asia, http://www.eetasia.com/ART_8800405639_480700_NT_5ae0362e.HTM#, accessed 09 July 2012, p. 1.

³⁵⁵ A.A.M. Deterink, 20 November 2008, Trustee's Sixth Report in the bankruptcy of LG.Philips Displays Holding B.V. and LG.Philips Displays Netherlands B.V. and LG.Philips Displays Investment B.V., <http://deterinklive.com/nl/publicaties/faillissementsverslagen/l/>, accessed 12 July 2012, pp. 7-17.

³⁵⁶ Undated, Company Overview of LP Displays, Business Week, <http://investing.businessweek.com/research/stocks/private/snapshot.ASP?privcapId=1492342>, accessed 09 July 2012, p. 1.

³⁵⁷ 13 March 1996, Zenith Breaks Ground for Expansion of Melrose Park Color Picture Tube Plant, PR Newswire, <http://www.thefreelibrary.com/ZENITH+BREAKS+GROUND+FOR+EXPANSION+OF+MELROSE+PARK+COLOR+PICTURE+TUBE...-a018086464>, accessed 16 July 2012, p. 1.

³⁵⁸ 27 November 2000, Philips and LG Join Forces in Display Components Activities, Business Wire, http://findarticles.com/p/articles/mi_m0EIN/is_2000_Nov_27/ai_67364504, accessed 19 February 2009, p. 1.

³⁵⁹ Philips, 21 December 2005, Philips writes off its book value for LG.Philips Displays, <http://www.newscenter.philips.com/main/standard/about/news/press/archive/2005/article-15235.wpd>, accessed 24 August 2012, pp. 1.

venture.³⁶⁰ Prior to the formation of LP Displays, Philips produced CRTs in Austria, Brazil, China, the Czech Republic, France, Spain, Taiwan, the U.K., and the U.S.³⁶¹

F. Mitsubishi Electric companies

Mitsubishi Electric (“Mitsubishi”), a member company of the Mitsubishi Group, is a major Japanese producer of electric and electronic equipment. The company was founded in 1921 and began producing color TVs in 1960.³⁶² Mitsubishi produced CRTs at plants in Mexico, Canada, and Japan.³⁶³

G. MT Picture Display companies

MT Picture Display (“MTPD”) was formed in April 2003 when Panasonic and Toshiba merged their non-Japanese CRT activities.³⁶⁴ In 2002, the companies had begun cooperating on sourcing for their CRT businesses through a joint venture named Matsushita Toshiba Displays Procurement Co.³⁶⁵ At the time that MTPD was formed, Panasonic and Toshiba possessed ownership shares of 64.5% and 35.5%, respectively.³⁶⁶ In April 2007, Panasonic acquired Toshiba’s share and changed the company’s name from Matsushita Toshiba Picture Display to MT Picture Display.³⁶⁷

Prior to the formation of MTPD, Panasonic produced CRTs at facilities in China, Japan, Germany, Malaysia, and the U.S.³⁶⁸ While the majority of Panasonic’s CRT activities were transferred to MTPD when the joint venture was established in 2001, Panasonic retained a factory in Takatsuki, Japan.³⁶⁹ Panasonic was known as Matsushita Electric Industrial until 2008

³⁶⁰ Philips, 21 December 2005, Philips writes off its book value for LG.Philips Displays, <http://www.newscenter.philips.com/main/standard/about/news/press/archive/2005/article-15235.wpd>, accessed 24 August 2012, pp. 1.

³⁶¹ Exhibit 3

³⁶² Mitsubishi Electric Corporation, 2012, About us - 1920s - 1970s: Mitsubishi Electric, <http://www.MitsubishiElectric.com/company/about/history/1920s-70s/index.html>, accessed 19 September 2012, pp.1-3.

³⁶³ Exhibit 3

³⁶⁴ Toshiba, 26 September 2002, Matsushita and Toshiba to Consolidate CRT Business, http://www.Toshiba.com/taec/news/press_releases/2002/to-238.jsp, accessed 23 August 2012, p. 1.

³⁶⁵ Toshiba, 26 September 2002, Matsushita and Toshiba to Consolidate CRT Business, http://www.Toshiba.com/taec/news/press_releases/2002/to-238.jsp, accessed 23 August 2012, p. 1.

³⁶⁶ Panasonic, 29 January 2003, Matsushita Announces Specific Plans Regarding New CRT Joint Venture with Toshiba, <http://panasonic.net/ir/relevant/en030129-6/en030129-6.html>, accessed 10 July 2012, p. 4.

³⁶⁷ Panasonic, 30 November 2005, Matsushita to Close CRT operations in North America and Europe, <http://panasonic.net/ir/relevant/2005/en051130-3.pdf>, accessed 10 July 2012.

³⁶⁸ Exhibit 3

³⁶⁹ Panasonic, 29 January 2003, Matsushita Announces Specific Plans Regarding New CRT Joint Venture with Toshiba, <http://panasonic.net/ir/relevant/en030129-6/en030129-6.html>, accessed 10 July 2012, p. 1.

Prior to the formation of MTPD, Toshiba produced CRTs at facilities in Indonesia, Japan Thailand, and the U.S. Like Panasonic, Toshiba retained its Japanese production facilities after the formation of MTPD.

H. Samsung companies

Samsung is a South Korean conglomerate which manufactures and markets consumer electronics. Samsung produced CRTs through Samsung SDI, which was founded in 1970 to manufacture CRTs, LCDs, PDPs, and other display products.³⁷⁰ The company's name was changed from Samsung Display Devices to Samsung SDI in 1999.³⁷¹ Samsung produced CRTs in Brazil, China, Germany, Hungary, Malaysia, Mexico, and South Korea.

I. Samtel companies³⁷²

The Samtel Group ("Samtel"), founded in 1973, is an Indian manufacturer of displays and electronic components. The company began producing black and white CRTs in 1973 through its subsidiary firm, Teletube Electronics. In 1987, Samtel Color, a Samtel subsidiary entered in 1986, entered into a technical collaboration agreement with Mitsubishi Electric and began producing color CPTs. Samtel's CRT production took place primarily through two subsidiaries: Samtel Color and Samtel India. Samtel Color produced color CPTs while Samtel India produced black and white CRTs.

J. Thai CRT

Thai CRT was a Thai manufacturer of CRTs. Thai CRT was partially owned by Mitsubishi until 2005, when the Siam Cement Group acquired Mitsubishi's share.³⁷³ The company produced CRTs and components through three subsidiaries, all of which operated in Thailand. Thai CRT passed a resolution of dissolution and ceased its business activities in June 2007.³⁷⁴

K. Thomson companies

³⁷⁰ Samsung, 2001, Consolidated Balance Sheets, SDCRT-0000039 - SDCRT-0000081 at 0048.

³⁷¹ Samsung, 2001, Consolidated Balance Sheets, SDCRT-0000039 - SDCRT-0000081 at 0048.

³⁷² See, e.g.,

- Samtel, 2012, About Us: Samtel Group, http://www.samtelgroup.com/?page=about_us, accessed 28 August 2012.
- Samtel, 2012, Samtel Color Ltd.: Corporate Profile, http://www.samtelcolor.com/?page=about_us, accessed 28 August 2012.
- Samtel, 2012, Samtel: Historical Milestones, <http://www.samtelgroup.com/?page=history>, accessed 28 August 2012.
- Samtel, 2000, Samtel India Limited [PT Division], <http://www.siplweb.com/samtel/group/sil-ptdiv-bhiwadi.ASP>, accessed 28 August 2012.

³⁷³ Thai CRT, Undated, Welcome to Thai CRT Co., Ltd., CHU00485646 - CHU00485666 at 5652.

³⁷⁴ Japan Fair Trade Commission, 27 October 2009, Cease-and-Desist Order and Surcharge Payment Orders against Manufacturers of Cathode Ray Tubes for Televisions, <http://www.jftc.go.jp/en/pressreleases/uploads/2009-Oct-7.pdf>, accessed 11 July 2012, p. 5.

Thomson Multimedia (“Thomson”) is a subsidiary of Thomson S.A., a French state-owned corporation.³⁷⁵ Thomson produced a variety of consumer electronics and multimedia products, including CRTs and CTVs. On June 28, 2005, Thomson reached an agreement to sell its CRT assets to Videocon, including plants in Poland, China, and Mexico,³⁷⁶ in exchange for equity in two major Videocon subsidiaries: Videocon International and Videocon Industries.³⁷⁷ Thomson had previously sold its plant in Italy to Videocon in January 2004.³⁷⁸ The deal allowed Thomson to exit the CRT industry.^{379,380} Thomson had previously manufactured CRTs in the United States as well.

L. Videocon companies

The Videocon group is an Indian conglomerate which, among other things, manufactures consumer electronics and appliances.³⁸¹ Notable Videocon subsidiaries include Videocon International, which manufactures consumer products,³⁸² and Videocon Industries, through which Videocon is involved in the oil and gas industry. Videocon also had “indirect control” of two Indian CRT manufacturers through glass supply and CPT purchasing.³⁸³ Videocon acquired Thomson’s CRT operations in China, Italy, Mexico, and Poland between 2004 and 2005.^{384,385}

XII. Appendix B: Econometric methods for pass-through

A. The basic regression

The pass-through rate can be estimated by regressing the price of the CRT product on the cost of the CRT.³⁸⁶ Mathematically, the regression equation for these studies can be represented by

³⁷⁵ Thomson, 30 May 2003, Thomson 20-F 2002, <http://www.technicolor.com/uploads/thomson20f2002.pdf>, accessed 28 August 2012, p. 24.

³⁷⁶ July 2005, Thomson Videocon I.F.A. Presentation, PHLP-CRT-005242 at 2.

³⁷⁷ September 2005, Videocon - Thomson M&A: Background & Implications, PHLP-CRT-009807 at 4.

³⁷⁸ July 2005, Thomson Videocon I.F.A. Presentation, PHLP-CRT-005242 at 3.

³⁷⁹ Thomson, 2005, Thomson Exits Tube Business Ahead of Schedule, PHLP-CRT-030355 - PHLP-CRT-030372 at 0364.

³⁸⁰ Dow Jones Newswires, 28 June 2005, Thomson Agrees to Sell Cathode-Ray Tube Business, <http://online.wsj.com/article/0,,SB111995081554171422,00.html>, accessed 21 August 2012, p. 1.

³⁸¹ July 2005, Thomson Videocon I.F.A. Presentation, PHLP-CRT-005242 at 9.

³⁸² September 2005, Videocon - Thomson M&A: Background & Implications, PHLP-CRT-009807 at 16.

³⁸³ September 2005, Videocon - Thomson M&A: Background & Implications, PHLP-CRT-009807 at 7.

³⁸⁴ July 2005, Thomson Videocon I.F.A. Presentation, PHLP-CRT-005242 at 3.

³⁸⁵ July 2005, Thomson Videocon I.F.A. Presentation, PHLP-CRT-005242 at 2.

³⁸⁶ The approach of regressing price on cost to estimate the pass-through rate is commonly used in the academic literature. See, e.g.,

- Doyle, Maura P., July 1997, The Effects of Interest Rates and Taxes on New Car Prices, Board of Governors of the Federal Reserve System Finance and Economics Discussion Series 1997-38.
- Stennek, Johan, and Frank Verboven, 03 May 2001, Merger Control and Enterprise Competitiveness - Empirical Analysis and Policy Recommendations, Research Institute of Industrial Economics Working Paper No. 556.

$$\text{price} = \alpha + \beta \text{ cost} + \varepsilon \quad \text{or} \quad p = \alpha + \beta c + \varepsilon,$$

where p is the price of the CRT product, c is the cost of the CRT, and ε represents the error term. In this equation, the pass-through rate, which is equal to the derivative $\partial p / \partial c$, is equal to β ; that is, the coefficient on the cost variable gives the pass-through rate.

Similar regressions can be used to estimate the pass-through rate for the entire distribution channel or a portion of it. In either case, the price paid by the downstream purchaser (which could be a product manufacturer, a distributor, a reseller, or an end customer) for whatever item the downstream purchaser buys (it could be a CRT or it could be a product containing a CRT) is regressed on the upstream cost of either the CRT or the CRT product. In each case, the coefficient on the upstream cost variable gives the pass-through rate.

In the regressions as applied to the CRT industry, the cost variable that is included generally captures the majority of the cost of the item that is being sold. For example, when a firm is a product distributor or a retailer, the cost included in the regression is the entire cost of the CRT product, be it a monitor or TV. When a firm is a product manufacturer, the cost included is the cost of the CRT,³⁸⁷ which is a substantial portion of the cost of both TV and monitors.³⁸⁸

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- See also footnote 314.

³⁸⁷ The cost data provided by some product manufacturers included the cost for the complete finished CRT product. This is likely due to the fact that some product manufacturers outsource the manufacturing of some products.

³⁸⁸ See, e.g.,

- CRT TVs:
 - The CRT accounts for approximately 50% of the total value of the components in a finished television. U.S. International Trade Commission, May 1995, Industry Trade Summary: Television Picture Tubes and Other Cathode-Ray Tubes, USITC Publication 2877, http://www.usitc.gov/publications/docs/pubs/industry_trade_summaries/PUB2877/PUB2877.PDF, accessed 15 March 2012, p.1.
 - LGE testified that CRTs account for approximately 50% of the total value of the components in a finished CRT TV. LGE 30(b)(6) Deposition of Kyung Tae Kwon, 13 July 2012, p. 54:22-25.
 - Another LGE employee estimated that CRTs accounted for between 60%-70% of the total component cost of CRT TVs. 11 July 2012, Deposition of LG Electronics 30(b)(6) Witness Yun Seok Lee (Hereinafter “LGE 30(b)(6) Deposition of Yun Seok Lee, 11 July 2012”), p. 72:14-18.
 - Toshiba testified that CRTs account for approximately 60%-65% of the total value of the components in a finished CRT TV. 01 August 2012, Deposition of Toshiba Corporation and Toshiba America Consumer Products 30(b)(6) Witness Yoshiaki Uchiyama (Hereinafter “Toshiba 30(b)(6) Deposition of Yoshiaki Uchiyama, 01 August 2012”), pp. 38:10-17 and 39:9.
 - DisplaySearch data covering 2006Q1 through 2008Q1 shows that the CRT accounts for approximately 52% of the total value of the components in finished 21-22" CRT TVs; 66% of 25-29" TVs; and 70% of 30-34" TVs. DisplaySearch, April 2008, Quarterly CRT TV Cost & Price Forecast Model Report, Q1'08 History with Q2'08-Q4'12 Forecasts, SDCRT-0002416.
- CRT Monitors:
 - Hitachi testified that CRTs account for approximately 45% to 55% of the total value of the components in a finished monitor. 12 July 2012, Deposition of Hitachi, Ltd. 30(b)(6) Witness Yasu Hisa Takeda, Volume I (Hereinafter “Hitachi 30(b)(6) Deposition of Yasu Hisa Takeda, Vol. I, 12 July 2012”), pp. 11:21-12:2.

B. Other determinants of price

Price and cost are the necessary variables for the calculation of the pass-through rate, but it is possible that product characteristics (e.g., screen size) may also have an impact on the price level. I include variables to control for different product characteristics to the extent possible given the data. The variety and detail of each dataset determine which characteristics can be reliably controlled for in each study. I run separate regressions for each application and, whenever possible, control for the following attributes: screen size, CRT manufacturer, resolution, high definition, and flat screen.³⁸⁹ These product attributes were selected based on industry documents, which commonly classified products using these criteria.³⁹⁰

Including additional regressors in the analyses does not affect the interpretation of the coefficient on the cost variable as the pass-through rate, nor does it constitute the use of a different method in any respect; rather, the inclusion of these regressors is a variation on the same method of regressing downstream price on an upstream cost. The purpose of adding additional regressors is to account for the unique characteristics inherent in each dataset. As stated above, I attempt to control for the same product attributes whenever the data allow; however, not all datasets contain identical information on CRTs or CRT products.³⁹¹

C. Variation in the data

In order to use regression analysis, variation must exist in the data. In other words, knowing only that a product sells for \$100 and costs \$50 is not informative of the pass-through rate, even if one observes that same combination of cost and price over time. These hypothetical data simply show that the price of the product is twice as large as the cost; there is no variation in cost or price from which I can draw meaningful conclusions regarding the impact of cost changes on price. In order to calculate the pass-through rate using regression analysis, I need observations that vary in price and in cost. There are two types of data variation that I can exploit: variations over time and variations over the cross-sectional unit.

If the data contain variations over time, I could observe the sale of a specific CRT at different points in time. If the cost of the CRT changes over time, then I can estimate how price changes when cost changes, which is the pass-through rate. With cross-sectional variation in the data, I would observe a specific CRT sold by different distributors or monitors containing different

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- LGE testified that CRTs account for approximately 50% of the total value of the components in a finished monitor. 09 July 2012, Deposition of LG Electronics 30(b)(6) Witness Mok Hyeon Seong, pp. 108:23-109:9.
 - LGE testified that CRTs account for approximately 60% of the total value of the components in finished monitors. 3 July 2012, Deposition of LG Electronics 30(b)(6) Witness Kyung Tae Kwon.

³⁸⁹ Not all datasets provided sufficient detail to control for these attributes. Some datasets provide additional information, allowing me to control for additional attributes including, but not limited to, the presence of the following: VCR or DVD TV combinations, wide screen, HD-ready, picture-in-picture, and re-manufactured/refurbished products.

³⁹⁰ Although there are other product characteristics, application, size, resolution, and manufacturer are the characteristics commonly used to differentiate CRTs.

³⁹¹ For example, some of the datasets I employ are for CRT TVs and contain information on whether the product contained a built-in VCR or DVD player, whereas other datasets contain only sales for CRT monitors. In the former case, it makes sense to control for VCR/DVD combo; in the latter case, it does not.

CRTs sold by the same retailer, at a given point in time. If the cost of the CRT to the different distributors or the cost of the CRT in the monitors differs, then I could estimate the pass-through rate.

Time series data control for differences in the cross-sectional unit. That is, in looking at the same product sold at the same outlet over time, I do not have to contend with differences in products and/or outlets that may also impact price. However, when observing changes in prices and costs over time, not only is the cost changing, but other factors are changing too, such as the quality of the product relative to other available products. For example, in 2003 MTPD first offered a specific model of 36" CRT TV with a flat screen and compatible with an ATSC (digital) tuner for \$1,499; by 2005, this same TV was being sold for only \$899.³⁹²

In contrast, cross-sectional data control for changes over time, such as the relative quality of the product, which may impact price. However, when observing multiple products or a product sold at multiple outlets at a single point in time, there may be differences across products and/or across outlets that may have an impact on price as well as on cost. For example, the same TV model will be more expensive at a local electronics store with knowledgeable salespeople and extensive displays than the same TV at Costco, which has minimal sales assistance and minimal displays.³⁹³

As a third alternative, economists often use what is referred to as panel data, which contains variation across time and across a cross-sectional unit.

Typically an economist will use whatever data are available, specifying the regression to the specific characteristics of the data available. For example, if one uses cross-sectional units, one can include variables to control for differences in cross-sectional units, and if one uses time-series data, one can include variables to control for changes that take place over time.

I follow this strategy. That is, I use whatever data are available, whether they have cross-sectional variation, time-series variation, or both, and control for other effects as appropriate.

D. Is the entire overcharge passed through?

Because the distribution channel is highly competitive, I expect to find that pass-through is close to 100%, for the reasons described in Section VIII.C. Therefore I test whether, in each econometric study, the estimated pass-through rate is statistically significantly different than 100%.³⁹⁴ For those studies that are statistically significantly different from 100%, I then test whether or not they are statistically significantly less than or greater than 100%.³⁹⁵

³⁹² A spreadsheet produced by MT Picture Display lists CRT television models and their street prices beginning in 1998 and ending in 2007. Undated, Price Spreadsheet, MTPD-0086013.

³⁹³ A spreadsheet from DisplaySearch lists monthly average street prices of CRT televisions at different retailers. For example, in July 2005, Costco sold a Philips 27PT543S televisions for \$180, while Best Buy sold the same model for \$220. Chunghwa Picture Tubes, LTD, 20 September 2005, TV Price Summary, CHU00303245.

³⁹⁴ To test whether or not the pass-through rate is statistically significantly different from 100%, I use a Wald test. Briefly, the Wald test is based on the difference between the estimated coefficient and the hypothesized value (so, in this case, the difference between the estimated coefficient and 1.00), relative to the standard error of the estimated coefficient. If the difference is (is not) sufficiently large, then one rejects (does not reject) the hypothesis that the true value of the coefficient is equal to the hypothesized value. Wooldridge, Jeffrey M., 2000, Introductory Econometrics, South-Western College Publishing, pp. 116-133. I use a 90% significance level in determining what

As I explained in Section VIII.C.1.c) when distribution firms operate in a perfectly competitive industry with constant costs, the theoretical pass-through rate is 100%. Because the distribution firms do not operate in a perfectly competitive industry, the pass-through rate inferred from the data may be greater than or less than 100%.

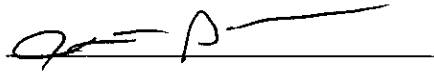
is sufficiently large to reject the null hypothesis; that is, I reject the null hypothesis when the p-value of the test statistic is less than 10%.

³⁹⁵ In order for the hypothesis tests to be valid, the estimated standard errors must be unbiased, which means that the data must not be heteroskedastic. Heteroskedasticity refers to the situation where the variance on the error term is not constant. If heteroskedasticity is present but is ignored, the estimated standard errors are biased, and using them for tests of significance is invalid. Wooldridge, Jeffrey M., 2000, *Introductory Econometrics*, South-Western College Publishing, pp. 248-249.

To test for the presence of heteroskedasticity, I use the Breusch-Pagan test. Briefly, the Breusch-Pagan test is based on the idea that if the data are homoskedastic, the estimates using ordinary least squares will not differ much from the estimates using maximum likelihood. Breusch, T.S., and A.R. Pagan, September 1979, A Simple Test for Heteroskedasticity and Random Coefficient Variation, *Econometrica*, Vol. 47, pp. 1287-1294.

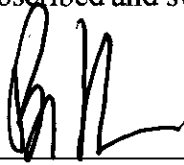
If I reject the null hypothesis of homoskedasticity (i.e., reject the null hypothesis of no heteroskedasticity), I calculate White's robust standard errors, which are unbiased and render the hypothesis testing valid. Hal White, 1980, A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity, *Econometrica*, Vol. 48, pp. 817-38. If the data are subject to heteroskedasticity, the White standard error will be correct. If I assume the data are heteroskedastic and they are not, the White standard error is still asymptotically consistent.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief. This declaration was executed on the 1st day of October 2012, at Ann Arbor, Michigan.



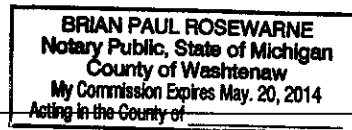
JANET S. NETZ

Subscribed and sworn to before me this 1 day of October 2012.



Notary Public

My commission expires: _____





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Founder and Partner, applEcon, May 2001 to present
Visiting Associate Professor, University of Michigan, Fall 2001, Fall 2002, Fall 2003
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Antitrust and Regulation (undergraduate)
Intermediate Microeconomics (undergraduate and master's)
Microeconomic Principles (undergraduate)
International Economics (undergraduate and master's)

Publications

"Are All Men's College Basketball Players Exploited?", with Erin Lane and Juan Nagel, *Journal of Sports Economics*, 2012 (forthcoming).

"Price Regulation: Theory and Performance", in *Regulation and Economics*, Roger J. Van den Bergh and Alessio M. Paccas, eds., Edward Elgar Publishing, 2011.

"Sports Trivia: A Review of The Economics of Intercollegiate Sports by Randy R. Grant, John Leadley, and Zenon Zygmunt", *Journal of Economic Literature*, 47(2), June 2009, 485-489.

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"International Integration and Growth: A Survey and Empirical Investigation", with Vivian Lei and Jon D. Haveman, *Review of Development Economics*, 5(2), June 2001.

"Price Regulation: A (Non-Technical) Overview", in *Encyclopedia of Law and Economics*, Boudewijn Bouckaert and Gerrit De Geest, eds, Edward Elgar and University of Ghent, 2000.

"Exercising Market Power in Proprietary Aftermarkets," with Severin Borenstein and Jeffrey K. MacKie-Mason, *Journal of Economic and Management Strategy*, 9(2), Summer 2000, 157-188.

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"Why Do All Flights Leave at 8am?: Competition and Departure-Time Differentiation in Airline Markets", with Severin Borenstein, *International Journal of Industrial Organization*, 17(5), July 1999, 611-640.

"An Empirical Test of the Effect of Basis Risk on Cash Market Positions", *Journal of Futures Markets*, 16(3), 289-312, May 1996.

"The Effect of Futures Markets and Corners on Storage and Spot Price Variability", *American Journal of Agricultural Economics*, 77(1), 182-193, February 1995.

"Antitrust Policy in Aftermarkets", with Severin Borenstein and Jeffrey K. MacKie-Mason, *Antitrust Law Journal*, 63(2), 455-482, Winter 1995.

"The Economics of Customer Lock-In and Market Power in Services", with Severin Borenstein and Jeffrey K. MacKie-Mason, in *The Service Productivity and Quality Challenge*, Patrick T. Harker, ed., Kluwer Academic, 1994.

Working Papers and Work in Progress

"Fantasy Football Points as a Measure of Performance", with Erin Lane and Juan Nagel

"Non-Profits and Price-Fixing: The Case of the Ivy League"

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle"

"Basis and Exchange Rate Risks and their Impact on Storage and Exports"

Research Grants and Awards

"Cooperation and Competition Among Nonprofits", Nonprofit Sector Research Fund, Aspen Institute, 2000.

"Product Customization and Product-Space Positioning", Dauch Center for the Management of Manufacturing Enterprises, Summer 2000.

"Outstanding Economics Professor of the Year", Economics Club, Purdue University, 1999.

"Trade Barriers, Trade Blocs, Growth, and Convergence", Purdue Research Foundation, 1998-1999.

"Effects of Informational Asymmetry on Competition in the Residential Long Distance Calling Market", Purdue Research Foundation, 1997-1998.

"Basis and Exchange Rate Risks and their Impact on Storage and Exports", Center for International Business and Economic Research, Summer 1997.

Global Initiative Faculty Grant (Course Development), "Industrial Organization in an International Marketplace", Purdue University, Summer 1997.

"Trade, Not Aid", Purdue Research Foundation, Summer 1996.

"Trade, Not Aid", Center for International Business and Economic Research, Summer 1996.

"The Effect of Price-Fixing by Institutions of Higher Education", Purdue Research Foundation, Summer 1995.

"Applied Microeconomics/International Workshop", Purdue University, Spring 1995.

"The Market Structure of Higher Education", University of Delaware, Summer 1993.

Research Associate, Center for the Study of Futures Markets, Columbia University, 1991.

Rackham Merit Fellowship, University of Michigan, 1987-1989.

Chancellor's Scholar, University of California at Berkeley, 1983-1986.

Referee

American Economic Review
Feminist Economics
International Journal of the Economics of Business
International Journal of Industrial Organization
Journal of Economic Education
Journal of Economic and Management Strategy
Journal of Family and Economic Issues
Journal of Futures Markets
Journal of Industrial Economics
Journal of Law and Economics
Journal of Law, Economics, and Organization
Management Science
Review of Economics and Statistics
Scandinavian Journal of Economics
Telecommunications Systems

Conference and Workshop Presentations

Panel participant, "Hot Topics Involving Experts in Antitrust Litigation", New York State Bar Association, Antitrust Law Section, Annual Meeting, New York, NY, January 2011.

Guest lecturer, Alternative Dispute Resolution Practicum, University of Michigan Law School, April 2008.

"The Economics of Indirect Purchaser Cases", State Bar of Arizona Annual Conference, Phoenix, AZ, June 2004.

"Manipulating Interface Standards as an Anti-Competitive Strategy", Standards and Public Policy Conference, Federal Reserve Bank of Chicago, Chicago, IL, May 2004.

"One-Way Standards as an Anti-Competitive Strategy", Telecommunications Policy Research Conference, Alexandria, VA, September 2002.

"Product Proliferation and Product Space Location", Econometric Society Meetings, New Orleans, January 2001.

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle", American Economics Association Meetings, New Orleans, January 2001.

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle", Indiana University-Purdue University Indianapolis, November 2000.

"Maximum or Minimum Differentiation? An Empirical Investigation into the Location of Firms", University of British Columbia, March 2000.

"Non-Profits and Price-Fixing: The Case of the Ivy League", University of Illinois, October 1999.

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle", Baylor University, September 1999.

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle", Western Economic Association Meetings, San Diego, July 1999.

"Non-Profits and Price-Fixing: The Case of the Ivy League", University of Chicago, April 1999.

"Non-Profits and Price-Fixing: The Case of the Ivy League", Indiana University, December 1998.

"International Integration and Growth: A Survey and Empirical Investigation", Dynamics, Economic Growth, and International Trade, III, Taiwan, August 1998.

Discussant ("Fiscal Policy and International Demand Spillovers"), Dynamics, Economic Growth, and International Trade, III, An International Conference, Taiwan, August 1998.

"International Integration and Growth", Workshop on Empirical Research in International Trade and Investment, Copenhagen, June 1998.

Discussant ("Factor Endowments and the Pattern of Affiliate Production by Multinational Enterprises," by Karolina Ekholm), Workshop on Empirical Research in International Trade and Investment, Copenhagen, June 1998.

"Non-Profits and Price-Fixing: The Case of the Ivy League", Department of Justice Antitrust Division, April 1998.

"Non-Profits and Price-Fixing: The Case of the Ivy League", American Economics Association Meetings, Chicago, January 1998.

Discussant ("Equilibrium under Satisficing," by Ralph W. Pfouts), International Atlantic Economics Society, ASSA Meetings, Chicago, January 1998.

Discussant ("Overseas Investments and Firm Exports," by Keith Head and John Ries), Fourth Annual Empirical Investigations in International Trade conference, Purdue University, November 1997.

"Maximum or Minimum Differentiation? An Empirical Investigation into the Location of Firms", International Atlantic Economic Association Conference, Philadelphia, October 1997.

Discussant ("Antidumping Enforcement in a Reciprocal Model of Dumping: Theory and Evidence," Taiji Furusawa and Thomas J. Prusa) and session chair, Third Annual Empirical Investigations in International Trade conference, Purdue University, November 1996.

"The Effect of Price-Fixing by Institutions of Higher Education", Indiana University-Purdue University Indianapolis, April 1996.

"Exercising Market Power in Proprietary Aftermarkets", with Severin Borenstein and Jeffrey K. MacKie-Mason, Indiana University - Purdue University - IUPUI First Tri-School Conference, March 1996.

"All in the Family: Family, Income, and Labor Force Attachment", with Jon D. Haveman, American Economic Association Meetings, San Francisco, January 1996.

"Family Matters: Unemployment, Wage Changes, and Mobility", with Jon D. Haveman, Southern Economics Association Meetings, New Orleans, November 1995.

Discussant and session chair, Second Annual Empirical Investigations in International Trade conference, Purdue University, November 1995.

"Competition and Anti-Competitive Behavior", ICLE (The State Bar of Michigan) Conference on Antitrust and Intellectual Property, July 1995.

"Price-Fixing, Tuition, and Financial Aid", Midwest Economics Association Meetings, Cincinnati, April 1995.

"Family Matters: Unemployment, Wage Changes, and Mobility," Midwest Economics Association Meetings, Cincinnati, April 1995.

Discussant and session chair, "Customer Discrimination, Entrepreneurial Decisions, and Investment", Midwest Economics Association Meetings, April 1995.

"An Empirical Test of the Effect of Basis Risk on Cash Market Positions", University of Illinois, Urbana-Champaign, February 1995.

Discussant and session chair, First Annual Empirical Investigations in International Trade conference, Purdue University, November 1994.

"Antitrust Policy in Aftermarkets", with Severin Borenstein and Jeffrey K. MacKie-Mason, FTC/DOJ/ABA Conference on Post-Chicago Economics, Washington, D.C., May 1994.

"The Effect of Price-Fixing by Institutions of Higher Education, University of Delaware, May 1994.

"The Effect of Futures Markets and Corners on Storage and Spot Price Variability", Purdue University, February 1994.

"An Empirical Test of the Effect of Basis Risk on Cash Market Positions", University of California at Davis, February 1993.

Discussant, Econometrics Association, Anaheim, 1992 Annual Meetings.

"Testing the Principle of Minimum Differentiation: Airline Departure-Time Crowding", Econometrics Association, Washington, D.C., 1990 Annual Meetings.

Consulting and Testifying

In re Photochromic Lens Antitrust Litigation, 2010-2012

United States District Court Middle District of Florida, Tampa Division, No. 8:10-md-02173-JDW-EAJ

Testifying expert for plaintiffs

Deposed August 2012

Datel Holdings and Datel Design and Development v. Microsoft, 2010-2011

United States District Court, Northern District of California, San Francisco Division, No. 09-cv-05535

Testifying expert for plaintiffs

Deposed October 2011

In re Prefilled Propane Tank Marketing and Sales Practices Litigation, 2010-2011

United States District Court, Western District of Missouri, Western Division, No. 4:09-cv-00465

Testifying expert for plaintiffs

In re Florida Cement and Concrete Antitrust Litigation, 2010

United States District Court, Southern District of Florida, Miami Division, No. 1:09-cv-23493-CMA

Consulting expert for plaintiffs

Altair Engineering v. MSC Software, 2009-2010

United States District Court, Eastern District of Michigan, Southern Division, No. 2:07-cv-12807

Testifying expert for plaintiffs

Deposed May 2010

In re Optical Disk Drive products Antitrust Litigation, 2009-2010

United States District Court, Northern District of California, San Francisco Division, No. M:2010-cv-02143

Consulting expert for plaintiffs

In re Flash Memory Antitrust Litigation, 2008-2011

United States District Court, Northern District of California, Oakland Division, No. C-07-0086-SBA

Testifying expert for plaintiffs

Deposed August 2009

Valassis Communications, Inc. v. News America, Inc., 2008-2009

United States District Court, Eastern District of Michigan, Southern Division, No. 2:06-cv-10240

Circuit Court of the State of Michigan, County of Wayne, No. 07-0706645-CZ

Consulting expert for plaintiffs

In re TFT-LCD (Flat Panel) Antitrust Litigation, 2008-present

United States District Court, Northern District of California, San Francisco Division, No. M:07-cv-01827

Testifying expert for plaintiffs

Deposed July 2009, June 2010, June 2011, August 2011

Houston Baptist University v. NCAA, 2008-2009

United States District Court in and for the Southern District of Texas, Houston Division

Testifying expert for plaintiffs

Seoul Semiconductor Co. v. Nichia Corp., 2008

United States District Court, Northern District of California, No. 3:08-cv-04932-PJH

Testifying expert for plaintiffs

Albert Andy Cohn v. Office Depot, 2008
Superior Court of the State of California, County of Los Angeles, Central District, No. BC 372449
Testifying expert for defendants

In re Graphics Processing Units Antitrust Litigation, 2007-2008
United States District Court Northern District of California, No. M:07-CV-01826-WHA
Testifying expert for plaintiffs
Deposed June 2008

Pro-Sys Consultants Ltd. and Neil Godfrey v. Microsoft, 2007-present
Supreme Court of British Columbia, No. L043175, Vancouver Registry
Testifying expert for plaintiffs
Deposed December 2008

In re Dynamic Random Access Memory (DRAM) Antitrust Litigation, 2007
United States District Court, Northern District of California, No. 02-cv-01486
Consulting expert for plaintiffs

Jason White et al. v. NCAA, 2006-2008
United States District Court Central District of California, No. CV 06-0999 RGK (MANx)
Testifying expert for plaintiffs
Deposed October 2007

Kleppner et al. v. Unocal, 2004-2008
In re Reformulated Gasoline (RFG) Antitrust and Patent Litigation
United States District Court Central District of California, No. 05-1671 CAS
Testifying expert for plaintiffs
Deposed December 2006

Carlisle, settlement negotiations with Crompton, EPDM price-fixing cartel, 2005-2007
Consulting expert

Caterpillar and Carlisle, settlement negotiations with DuPont-Dow Elastomers, PCP (or CR) and EPDM price-fixing cartels, 2004-2005
Consulting expert

City and County of San Francisco et al. v. Microsoft, 2004-present
United States District Court for the District of Maryland, No. 1332
Testifying expert for plaintiffs

The Service Source v. Office Depot, 2004-2005
United States District Court Eastern District of Michigan Southern Division, No. 02-73361
Project director

Joe Comes et al. v. Microsoft, 2002-2008
Iowa District Court for Polk County, No. CL82311
Testifying expert for plaintiffs
Deposed July 2006, November 2006

Charles Cox et al. v. Microsoft, 2002-2006
Supreme Court of the State of New York County of New York, No. 105193/00
Testifying expert for plaintiffs

Daniel Gordon et al. v. Microsoft, 2002-2004
State of Minnesota District Court County of Hennepin Fourth Judicial District, No. 00-5994
Testifying expert for plaintiffs
Deposed September 2003

Morelock Enterprises, Inc. v. Weyerhaeuser Co., 2004-2008
United States District Court District of Oregon, No. 3:04-cv-00583-PA
Testifying expert for plaintiffs
Deposed October 2004, April 2005, October 2007
Testified in trial April 2008

Compuware v. IBM, 2002-2005
United States District Court for the Eastern District of Michigan, No. 02-70906
Project director

Lingo et al. v. Microsoft, 1999-2004
Superior Court of the State of California City and County of San Francisco, J.C.C.P. No. 4106
Project director
In re New Mexico Indirect Purchaser Microsoft Corp. Antitrust Litigation, 2002-2004
State of New Mexico First Judicial District, No. D-0101-CV-2000-1697
Testifying expert for plaintiffs

Charles Friedman et al. v. Microsoft, 2002-2004
Superior Court of the State of Arizona in and for the County of Maricopa, No. CV2000-000722 / CV2000-005872
Testifying expert for plaintiffs
Deposed September 2003

In re Massachusetts Consumer Protection Litigation, 2003-2004
Commonwealth of Massachusetts, Superior Court Department of the Trial Court Middlesex Division, No. 00-2456
Consulting expert

Olson v. Microsoft, 2002
Montana First Judicial District Court Lewis & Clark County, No. CDV-2000-219
Consulting expert

Covad v. Bell Atlantic (Verizon), 2001-2004
United District Court for the District of Columbia, No. 99-1046
Project director

AMD, 2000-2004
Project director

Gravity et al. v. Microsoft, 1999-2003
United States District Court for the District of Columbia, No. 1:99CV00363
Staff economist

Leckrone, et al. v. Premark International, Inc., et al., 2001
Testifying expert for plaintiffs

Ren, et al. v. EMI Music Distribution, Inc., 2001
State of Michigan in the Circuit Court of the County of Macomb, No. 00-2383-CZ
Testifying expert for plaintiffs

SBC, 2000
Staff economist

City and County of San Francisco, 1999
Staff economist

Intergraph v. Intel, 1998-2001

United States District Court Appeals for the Federal District, No. 98-1308

Staff economist

Comm-Tract v. Northern Telecom, 1991-1997

United States District Court District of Massachusetts, No. 90-13088-WF

Project director

Systemcare, Inc. v. Wang Computer, 1991-1993

United States District Court for the District of Colorado, No. 89-B-1778

Staff economist

International Travel Arrangers v. Northwest Airlines, 1988-1989

Staff economist

**Exhibit B: Documents Considered in the
Expert Report of Janet S. Netz, PhD
Part 1: Bates Numbered Documents**

AMZ 00001	BMCC-CRT000266592	BMCC-CRT000592982
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CHU00030827	CHU00030957	CHU00031095
CHU00030831	CHU00030960	CHU00031098
CHU00030835	CHU00030965	CHU00031101
CHU00030839	CHU00030971	CHU00031105
CHU00030841	CHU00030973	CHU00031107
CHU00030843	CHU00030976	CHU00031110
CHU00030846	CHU00030979	CHU00031111
CHU00030851	CHU00030985	CHU00031113
CHU00030853	CHU00030992	CHU00031115
CHU00030855	CHU00030995	CHU00031116
CHU00030869	CHU00030998	CHU00031117

**Exhibit B: Documents Considered in the
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CHU00031119	CHU00031209	CHU00036377
CHU00031121	CHU00031214	CHU00036378
CHU00031122	CHU00031221	CHU00036382
CHU00031123	CHU00031227	CHU00036384
CHU00031126	CHU00031232	CHU00036386
CHU00031129	CHU00031240	CHU00036388
CHU00031133	CHU00031248	CHU00036390
CHU00031134	CHU00031249	CHU00036392
CHU00031136	CHU00031253	CHU00036394
CHU00031137	CHU00031254	CHU00036396
CHU00031138	CHU00031255	CHU00036398
CHU00031140	CHU00031262	CHU00036402
CHU00031141	CHU00031262	CHU00036404
CHU00031142	CHU00031268	CHU00036406
CHU00031148	CHU00031272	CHU00036408
CHU00031150	CHU00031274	CHU00036410
CHU00031153	CHU00031278	CHU00036412
CHU00031154	CHU00031279	CHU00036414
CHU00031155	CHU00031380	CHU00036416
CHU00031159	CHU00031804	CHU00040988
CHU00031161	CHU00031805	CHU00045143
CHU00031163	CHU00031819	CHU00047658
CHU00031168	CHU00031822	CHU00050612
CHU00031172	CHU00032057	CHU00052905
CHU00031174	CHU00032059	CHU00057335
CHU00031176	CHU00032064	CHU00057658
CHU00031177	CHU00032068	CHU00066922
CHU00031178	CHU00032071	CHU00071226
CHU00031180	CHU00032076	CHU00071475
CHU00031182	CHU00032092	CHU00071477
CHU00031183	CHU00032196	CHU00071480
CHU00031186	CHU00032940	CHU00072808
CHU00031188	CHU00032948	CHU00075287
CHU00031190	CHU00033201	CHU00075805
CHU00031194	CHU00033227	CHU00078587
CHU00031202	CHU00033229	CHU00079140

**Exhibit B: Documents Considered in the
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CHU00080445	CHU0012216	CHU00125098
CHU00080893	CHU00122171	CHU00125116
CHU00081871	CHU00122804	CHU00125144
CHU00087513	CHU00122864	CHU00125162
CHU00088029	CHU00123024	CHU00125166
CHU00088671	CHU00123297	CHU00125168
CHU00089485	CHU00123347	CHU00125171
CHU00089496	CHU00123358	CHU00125181
CHU00090021	CHU00123371	CHU00125185
CHU00093051	CHU00123375	CHU00125190
CHU00094753	CHU00123383	CHU00125192
CHU00094958	CHU00123393	CHU00125195
CHU00095334	CHU00123428	CHU00125199
CHU00099330	CHU00123483	CHU00125257
CHU00100274	CHU00123530	CHU00125257
CHU00102752	CHU00123561	CHU00125296
CHU00102864	CHU00123733	CHU00125374
CHU00104484	CHU00123742	CHU00125421
CHU00105275	CHU00123746	CHU00125434
CHU00105346	CHU00124017	CHU00125652
CHU00105555	CHU00124020	CHU00125654
CHU00106233	CHU00124022	CHU00125655
CHU00106844	CHU00124024	CHU00125657
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CHU00109024	CHU00124030	CHU00125701
CHU00117144	CHU00124033	CHU00125713
CHU00117458	CHU00124035	CHU00125849
CHU00118323	CHU00124099	CHU00125993
CHU00119823	CHU00124103	CHU00125993
CHU00120771	CHU00124110	CHU00126041
CHU00121005	CHU00124116	CHU00126131
CHU00121161	CHU00124930	CHU00136669
CHU00121711	CHU00124993	CHU00149423
CHU00121778	CHU00125001	CHU00154037
CHU00121960	CHU00125005	CHU00154421
CHU00122045	CHU00125007	CHU00168279

**Exhibit B: Documents Considered in the
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CHU00169692	CHU00382381	CHU00473289
CHU00172484	CHU00382819	CHU00477126
CHU00179905	CHU00384083	CHU00477799
CHU00188664	CHU00385281	CHU00478872
CHU00188951	CHU00386334	CHU00479250
CHU00191946	CHU00386769	CHU00484870
CHU00207940	CHU00388397	CHU00485646
CHU00217276	CHU00391781	CHU00485812
CHU00250547	CHU00392224	CHU00488587
CHU00269383	CHU00393933	CHU00491786
CHU00281352	CHU00395198	CHU00492942
CHU00288227	CHU00401183	CHU00492950
CHU00289150	CHU00402025	CHU00492950
CHU00289202	CHU00403247	CHU00499227
CHU00295705	CHU00406227	CHU00501008
CHU00296012	CHU00413033	CHU00502432
CHU00297707	CHU00414733	CHU00507050
CHU00303245	CHU00414739	CHU00507374
CHU00311953	CHU00416295	CHU00513829
CHU00318860	CHU00416469	CHU00515366
CHU00331635	CHU00417829	CHU00524129
CHU00338140	CHU00417908	CHU00524992
CHU00358700	CHU00418449	CHU00529073
CHU00363098	CHU00419092	CHU00530288
CHU00372752	CHU00419647	CHU00530295
CHU00373452	CHU00419667	CHU00532295
CHU00373851	CHU00420478	CHU00532951
CHU00374510	CHU00421009	CHU00532952
CHU00375118	CHU00421095	CHU00535641
CHU00375215	CHU00421111	CHU00540552
CHU00376162	CHU00421844	CHU00545253
CHU00376843	CHU00437643	CHU00545730
CHU00377474	CHU00453802	CHU00549116
CHU00378103	CHU00454594	CHU00550362
CHU00380803	CHU00457257	CHU00550744
CHU00381353	CHU00468598	CHU00550897

**Exhibit B: Documents Considered in the
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CHU00553887	CHU00642834	CHU00660464
CHU00571826	CHU00646093	CHU00660476
CHU00573812	CHU00646768	CHU00660501
CHU00573814	CHU00646803	CHU00660515
CHU00576066	CHU00647102	CHU00660523
CHU00578887	CHU00647104	CHU00660539
CHU00597476	CHU00647932	CHU00660549
CHU00597905	CHU00648817	CHU00660561
CHU00597922	CHU00648818	CHU00660575
CHU00598215	CHU00653029	CHU00660586
CHU00607654	CHU00653030	CHU00660594
CHU00608095	CHU00655716	CHU00660606
CHU00608743	CHU00655718	CHU00660616
CHU00611605	CHU00656459	CHU00660643
CHU00615145	CHU00659413	CHU00660656
CHU00615163	CHU00659671	CHU00660662
CHU00615181	CHU00660194	CHU00660671
CHU00615712	CHU00660198	CHU00660681
CHU00616369	CHU00660202	CHU00660693
CHU00617790	CHU00660209	CHU00660699
CHU00624682	CHU00660217	CHU00660709
CHU00628898	CHU00660221	CHU00660717
CHU00629335	CHU00660225	CHU00660728
CHU00631948	CHU00660235	CHU00661917
CHU00632268	CHU00660239	CHU00673063
CHU00632378	CHU00660247	CHU00678247
CHU00632846	CHU00660306	CHU00678641
CHU00633824	CHU00660369	CHU00681869
CHU00633902	CHU00660373	CHU00682158
CHU00633905	CHU00660383	CHU00682227
CHU00633978	CHU00660395	CHU00682979
CHU00634498	CHU00660408	CHU00688567
CHU00635046	CHU00660426	CHU00689347
CHU00635116	CHU00660436	CHU00693069
CHU00636140	CHU00660446	CHU00693080
CHU00639515	CHU00660454	CHU00706329

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CHU00709991	CHWA00000010	COMP_CRT00000003
CHU00718308	CHWA00000011	CRT00000466
CHU00718839	CHWA00000012	CRT-CC-000001
CHU00722454	CHWA00000013	CRT-CC-000001
CHU00725669	CHWA00000014	CRT-CC-000001
CHU00725774	CHWA00000014	CRT-CC-000001
CHU00725833	CHWA00000140	CRT-INGRAM0001
CHU00732798	CHWA00010117	CRT-INGRAM0002
CHU00732831	CHWA00011550	CRT-INGRAM0003
CHU00734336	CHWA00015235	CRT-INGRAM0004
CHU00734349	CHWA00017020	CRT-INGRAM0005
CHU00734351	CHWA00029907	CRT-INGRAM0006
CHU00734954	CHWA00032001	CRT-INGRAM0007
CHU00735066	CHWA00032115	CRT-INGRAM0008
CHU00735249	CHWA00042517	CRT-INGRAM0009
CHU00735250	CHWA00048095	CRT-INGRAM0010
CHU00735251	CHWA00052613	DISP_LCD_000128
CHU00735256	CHWA00062147	DISP_LCD_000129
CHU00735283	CHWA00069568	EIN0001646
CHU00735287	CHWA00070981	EIN0007630
CHU00735291	CHWA00088192	EIN0008511
CHU00735295	CHWA00106460	EIN0008741
CHU00735298	CHWA00123560	EIN0012176
CHU00735299	CHWA00129231	EIN0012319
CHU00735380	CHWA00129721	EIN0012936
CHU00735387	CHWA00145996	EIN0013251
CHUOO119571	CHWA00195847	EIN0017699
CHWA00000001	CHWA00197071	EIN0045304
CHWA00000002	CHWA00239086	EIN0045706
CHWA00000003	CHWA00242220	EIN0093371
CHWA00000004	CHWA00248458	EIN0096752
CHWA00000005	CHWA00252447	EIN0097477
CHWA00000006	CHWA00253374	EIN0107208
CHWA00000007	CHWA00256934	ENV_NAT_00001
CHWA00000008	COMP_CRT00000001	ENV_NAT_00002
CHWA00000009	COMP_CRT00000002	FOX00007278

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FOX00017104	HDP-CRT00044122	HEDUS-CRT00026544
FOX00206921	HDP-CRT00047209	HEDUS-CRT00029023
FOX00289507	HDP-CRT00048049	HEDUS-CRT00033182
FOX00349257	HDP-CRT00049520	HEDUS-CRT00033736
FOX00360836	HDP-CRT00051622	HEDUS-CRT00034967
HAL-CRT-00000052	HDP-CRT00056546	HEDUS-CRT00037581
HAL-CRT00001769	HDP-CRT00056730	HEDUS-CRT00039696
HAL-CRT00004153	HDP-CRT00057240	HEDUS-CRT00044346
HAL-CRT00004975	HEDUS-CRT00000162	HEDUS-CRT00047779
HAS-CRT00014814	HEDUS-CRT00000612	HEDUS-CRT00049395
HAS-CRT00017921	HEDUS-CRT00001906	HEDUS-CRT00051194
HAS-CRT00018558	HEDUS-CRT00002029	HEDUS-CRT00062277
HAS-CRT00019876	HEDUS-CRT00002035	HEDUS-CRT00063068
HAS-CRT00035961	HEDUS-CRT00002071	HEDUS-CRT00063591
HAS-CRT00036054	HEDUS-CRT00002177	HEDUS-CRT00063642
HAS-CRT00040396	HEDUS-CRT00002861	HEDUS-CRT00067732
HAS-CRT00053869	HEDUS-CRT00003041	HEDUS-CRT00071204
HAS-CRT00064973	HEDUS-CRT00003070	HEDUS-CRT00076244
HAS-CRT00065516	HEDUS-CRT00003071	HEDUS-CRT00081461
HAS-CRT00065649	HEDUS-CRT00005200	HEDUS-CRT00096837
HAS-CRT00066029	HEDUS-CRT00005546	HEDUS-CRT00104763
HDP-CRT00005979	HEDUS-CRT00009166	HEDUS-CRT00126016
HDP-CRT00007631	HEDUS-CRT00012186	HEDUS-CRT00126196
HDP-CRT00018516	HEDUS-CRT00014404	HEDUS-CRT00126328
HDP-CRT00018516T	HEDUS-CRT00015110	HEDUS-CRT00126463
HDP-CRT00018517	HEDUS-CRT00015540	HEDUS-CRT00146312
HDP-CRT00018518	HEDUS-CRT00017051	HEDUS-CRT00151290
HDP-CRT00019322	HEDUS-CRT00018407	HEDUS-CRT00152072
HDP-CRT00024225	HEDUS-CRT00020788	HEDUS-CRT00152139
HDP-CRT00027899	HEDUS-CRT00020789	HEDUS-CRT00152150
HDP-CRT00030309	HEDUS-CRT00020790	HEDUS-CRT00152762
HDP-CRT00031213	HEDUS-CRT00020791	HEDUS-CRT00152810
HDP-CRT00033683	HEDUS-CRT00020792	HEDUS-CRT00155212
HDP-CRT00037583	HEDUS-CRT00020793	HEDUS-CRT00155298
HDP-CRT00037612	HEDUS-CRT00020794	HEDUS-CRT00155907
HDP-CRT00040299	HEDUS-CRT00022872	HEDUS-CRT00155940

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HEDUS-CRT00158232	LGE00044913	LGE00065495
HEDUS-CRT00159574	LGE00046015	LGE00067202
HEDUS-CRT00159817	LGE00049118	LGE00068402
HEDUS-CRT00159846	LGE00049228	LGE00068664
HEDUS-CRT00159939	LGE00050133	LGE00069046
HEDUS-CRT00162087	LGE00050474	LGE00069189
HEDUS-CRT00163723	LGE00050755	LGE00070915
HEDUS-CRT00166844	LGE00050974	LGE00073717
HEDUS-CRT00168473	LGE00051383	LGE00076321
HEDUS-CRT00172022	LGE00051520	LGE00076322
HEDUS-CRT00173035	LGE00051690	LGE00077194
HEDUS-CRT00174034	LGE00051737	LGE00078775
HEDUS-CRT00177346	LGE00051939	LGE00079056
HEDUS-CRT00177823	LGE00051948	LGE00079473
HEDUS-CRT00179555	LGE00051977	LGE00079676
HEDUS-CRT00179654	LGE00051978	LGE00081653
HEDUS-CRT00179660	LGE00053339	LGE00081655
HEDUS-CRT00179696	LGE00053385	LGE00082588
HEDUS-CRT00179852	LGE00053624	LGE00082760
HTC-CRT000000020	LGE00053662	LGE00082762
HTC-CRT000000737	LGE00053684	LGE00082765
LGE00002248	LGE00053780	LGE00083154
LGE00005290	LGE00054179	LGE00083841
LGE00009413	LGE00054431	LGE00087354
LGE00009465	LGE00055218	LGE00089293
LGE00009841	LGE00057134	LGE00089431
LGE00009844	LGE00057293	LGE00091165
LGE00009918	LGE00058322	LGE00091898
LGE00010017	LGE00059377	LGE00091900
LGE00010071	LGE00059504	LGE00091909
LGE00010193	LGE00059639	LGE00091912
LGE00010355	LGE00059642	LGEUSA0000001
LGE00010602	LGE00060500	LGEUSA0001061
LGE00011058	LGE00060914	LGEUSA0001068
LGE00011209	LGE00062760	LGEUSA0001073
LGE00042824	LGE00063138	LPD_00013386

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LPD_00013819	MPTD-00653620	MPTD-00653657
LPD_00013836	MPTD-00653621	MPTD-00653658
LPD_00014093	MPTD-00653622	MPTD-00653659
LPD_00014197	MPTD-00653623	MPTD-00653660
LPD_00014972	MPTD-00653624	MPTD-00653661
LPD_00014974	MPTD-00653625	MPTD-00653662
LPD_00017254	MPTD-00653627	MPTD-00653663
LPD_00030912	MPTD-00653628	MPTD-00653664
LPD_00031538	MPTD-00653629	MPTD-00653665
LPD_00031539	MPTD-00653630	MPTD-00653666
LPD_00031540	MPTD-00653631	MPTD-00653667
LPD_00031769	MPTD-00653632	MPTD-00653668
LPD_00034186	MPTD-00653633	MPTD-00653669
LPD_00034198	MPTD-00653634	MPTD-00653670
LPD_00034201	MPTD-00653635	MPTD-00653671
LPD_00034203	MPTD-00653636	MPTD-00653672
LPD_00034208	MPTD-00653637	MPTD-00653673
LPD_00034228	MPTD-00653638	MPTD-00653674
LPD_00034241	MPTD-00653639	MPTD-00653675
LPD_00034248	MPTD-00653640	MPTD-00653676
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LPD_00034786	MPTD-00653642	MPTD-00653678
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LPD_00036154	MPTD-00653646	MTPD-00653455
LPD_00036774	MPTD-00653647	MTPD-00653456
LPD_00041318	MPTD-00653648	MTPD-00653457
LPD_00041972	MPTD-00653649	MTPD-00653459
LPD_00041973	MPTD-00653650	MTPD-00653460
LPD_00042476	MPTD-00653651	MTPD-00653461
LPD_00042478	MPTD-00653652	MTPD-00653462
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LPD_00042928	MPTD-00653655	MTPD-00653465
MPTD-00653619	MPTD-00653656	MTPD-00653466

**Exhibit B: Documents Considered in the
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MTPD-00653467	MTPD-00653590	MTPD-00653706
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MTPD-00653469	MTPD-00653592	MTPD-00653714
MTPD-00653470	MTPD-00653594	MTPD-00653737
MTPD-00653473	MTPD-00653595	MTPD-00653738
MTPD-00653474	MTPD-00653597	MTPD-00653753
MTPD-00653475	MTPD-00653598	MTPD-00653758
MTPD-00653476	MTPD-00653599	MTPD-0082527
MTPD-00653478	MTPD-00653600	MTPD-0082529
MTPD-00653479	MTPD-00653612	MTPD-0082530
MTPD-00653480	MTPD-00653613	MTPD-0083663
MTPD-00653481	MTPD-00653614	MTPD-0084106
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MTPD-00653521	MTPD-00653680	MTPD-0161403
MTPD-00653524	MTPD-00653681	MTPD-0164693
MTPD-00653525	MTPD-00653682	MTPD-0165028
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MTPD-00653536	MTPD-00653686	MTPD-0183683
MTPD-00653546	MTPD-00653687	MTPD-0194013
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MTPD-00653588	MTPD-00653697	MTPD-0244685
MTPD-00653589	MTPD-00653698	MTPD-0247084

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MTPD-0248484	MTPD-0404366	MTPD-0468631
MTPD-0275029	MTPD-0410018	MTPD-0479632
MTPD-0282214	MTPD-0410020	MTPD-0479738
MTPD-0300203	MTPD-0410020	MTPD-0479739
MTPD-0327190	MTPD-0410562	MTPD-0479742
MTPD-0327723	MTPD-0413158	MTPD-0479751
MTPD-0327724	MTPD-0416090	MTPD-0479781
MTPD-0327725	MTPD-0418116	MTPD-0483335
MTPD-0327726	MTPD-0421698	MTPD-0483338
MTPD-0327727	MTPD-0422948	MTPD-0493552
MTPD-0327728	MTPD-0423111	MTPD-0497280
MTPD-0327729	MTPD-0423166	MTPD-0504720
MTPD-0327730	MTPD-0423645	MTPD-0504721
MTPD-0330545	MTPD-0423646	MTPD-0508516
MTPD-0332860	MTPD-0423651	MTPD-0514562
MTPD-0336313	MTPD-0423658	MTPD-0516759
MTPD-0338867	MTPD-0423668	MTPD-0517933
MTPD-0343504	MTPD-0423675	MTPD-0518169
MTPD-0343949	MTPD-0423825	MTPD-0525932
MTPD-0345134	MTPD-0423916	MTPD-0526950
MTPD-0347731	MTPD-0424320	MTPD-0527744
MTPD-0400021	MTPD-0426088	MTPD-0529560
MTPD-0400111	MTPD-0426099	MTPD-0533328
MTPD-0400564	MTPD-0428403	MTPD-0538527
MTPD-0400573	MTPD-0428439	MTPD-0544058
MTPD-0400580	MTPD-0428453	MTPD-0545662
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MTPD-0401221	MTPD-0436378	MTPD-0550144
MTPD-0401222	MTPD-0438320	MTPD-0550829
MTPD-0401223	MTPD-0454522	MTPD-0551610
MTPD-0401224	MTPD-0454526	MTPD-0553425
MTPD-0401225	MTPD-0455816	MTPD-0561869
MTPD-0401226	MTPD-0457654	MTPD-0570292
MTPD-0401227	MTPD-0463507	MTPD-0570828
MTPD-0401463	MTPD-0468550	MTPD-0570911

**Exhibit B: Documents Considered in the
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MTPD-0572750	MTPD-0599132	ODP000049
MTPD-0572806	MTPD-0599134	ODP000340
MTPD-0573620	MTPD-0605248	ODP000381
MTPD-0573703	MTPD-0607489	PC-0003982
MTPD-0573740	MTPD-0607571	PC-0020557
MTPD-0573783	MTPD-0607585	PHLP-CRT-001323
MTPD-0574374	MTPD-0607598	PHLP-CRT-001557
MTPD-0575489	MTPD-0607605	PHLP-CRT-002306
MTPD-0575714	MTPD-0607728	PHLP-CRT-003818
MTPD-0575940	MTPD-0608058	PHLP-CRT-005242
MTPD-0575968	MTPD-0608932	PHLP-CRT-006657
MTPD-0576023	MTPD-0610046	PHLP-CRT-006753
MTPD-0576311	MTPD-0637764	PHLP-CRT-009137
MTPD-0576458	MTPD-0652301	PHLP-CRT-009807
MTPD-0576464	MTPD-0652308	PHLP-CRT-010175
MTPD-0576723	MTPD-0652308	PHLP-CRT-012076
MTPD-0576738	MTPD-0652322	PHLP-CRT-012360
MTPD-0576804	MTPD-0653484	PHLP-CRT-012378
MTPD-0576881	MTPDA_SEC-0692820	PHLP-CRT-012646
MTPD-0580567	MTPDA_SEC-0830214	PHLP-CRT-013964
MTPD-0580726	MTPDA_SEC-0830216	PHLP-CRT-014141
MTPD-0580727	MTPDA_SEC-1050750	PHLP-CRT-014144
MTPD-0580737	MTPDA_SEC-1051148	PHLP-CRT-014272
MTPD-0580741	MTPDA_SEC-1051557	PHLP-CRT-014292
MTPD-0580751	MTPDA_SEC-1051935	PHLP-CRT-014819
MTPD-0580775	MTPDA_SEC-1052303	PHLP-CRT-014819
MTPD-0580782	MTPDA_SEC-1052728	PHLP-CRT-014823
MTPD-0580795	MTPDA_SEC-1053134	PHLP-CRT-014823
MTPD-0580798	MTPDA_SEC-1053518	PHLP-CRT-015235
MTPD-0580821	MTPDA_SEC-1053906	PHLP-CRT-015377
MTPD-0580871	MTPDA_SEC-1054265	PHLP-CRT-015381
MTPD-0581343	MTPDA_SEC-1054605	PHLP-CRT-015551
MTPD-0582464	MTPDA_SEC-1111992	PHLP-CRT-017195
MTPD-0583075	MTPDA_SEC-1377349	PHLP-CRT-020258
MTPD-0583080	ODP000001	PHLP-CRT-020283
MTPD-0597225	ODP000035	PHLP-CRT-021368

**Exhibit B: Documents Considered in the
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PHLP-CRT-021368	PHLP-CRT-082072	SDCRT-0001619
PHLP-CRT-022384	PHLP-CRT-088261	SDCRT-0001654
PHLP-CRT-024697	PHLP-CRT-088450	SDCRT-0001675
PHLP-CRT-024925	PHLP-CRT-088752	SDCRT-0001715
PHLP-CRT-025872	PHLP-CRT-095826	SDCRT-0001750
PHLP-CRT-026590	PHLP-CRT-095826	SDCRT-0001818
PHLP-CRT-027718	PHLP-CRT-095826	SDCRT-0001846
PHLP-CRT-027856	PHLP-CRT-096125	SDCRT-0001854
PHLP-CRT-028050	PHLP-CRT-098244	SDCRT-0002028
PHLP-CRT-029512	PHLP-CRT-123025	SDCRT-0002029
PHLP-CRT-030355	PHLP-CRT-130382	SDCRT-0002130
PHLP-CRT-030989	PHLP-CRT-130383	SDCRT-0002203
PHLP-CRT-034835	PHLP-CRT-130384	SDCRT-0002283
PHLP-CRT-034835	PHLP-CRT-130385	SDCRT-0002363
PHLP-CRT-035382	PHLP-CRT-130386	SDCRT-0002375
PHLP-CRT-038749	PHLP-CRT-130387	SDCRT-0002412
PHLP-CRT-039598	PHLP-CRT-130388	SDCRT-0002413
PHLP-CRT-039880	PHLP-CRT-130389	SDCRT-0002414
PHLP-CRT-048267	PHLP-CRT-130390	SDCRT-0002415
PHLP-CRT-048269	PHLP-CRT-130391	SDCRT-0002416
PHLP-CRT-051982	PNA-0017752	SDCRT-0002526
PHLP-CRT-052781	PNA-0021689	SDCRT-0002582
PHLP-CRT-053815	PNA-0027169	SDCRT-0002984
PHLP-CRT-056099	PNA-0027170	SDCRT-0002998
PHLP-CRT-067513	PNA-0027171	SDCRT-0003034
PHLP-CRT-069570	PNA-0027172	SDCRT-0003036
PHLP-CRT-070774	PNA-0027173	SDCRT-0005709
PHLP-CRT-071977	PNA-0027174	SDCRT-0005717
PHLP-CRT-072002	PNA-0027182	SDCRT-0005831
PHLP-CRT-072983	SDCRT-0000006	SDCRT-0005929
PHLP-CRT-076881	SDCRT-0000039	SDCRT-0005941
PHLP-CRT-079204	SDCRT-0000121	SDCRT-000598
PHLP-CRT-080277	SDCRT-0000426	SDCRT-0006041
PHLP-CRT-080289	SDCRT-0000469	SDCRT-0006442
PHLP-CRT-080312	SDCRT-0000523	SDCRT-0006513
PHLP-CRT-081989	SDCRT-0000664	SDCRT-0006587

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SDCRT-0006593	SDCRT-0045335	SDCRT-0076728
SDCRT-0007275	SDCRT-0045335P-0001	SDCRT-0076841
SDCRT-0007588	SDCRT-0048629	SDCRT-0076899
SDCRT-00087007	SDCRT-0048630	SDCRT-0076900
SDCRT-0009115	SDCRT-0051721	SDCRT-0076901
SDCRT-0009585	SDCRT-0054235	SDCRT-0077730
SDCRT-0009709	SDCRT-0055339	SDCRT-0077779
SDCRT-0011038P-0001	SDCRT-0059164	SDCRT-0077924
SDCRT-0011363	SDCRT-0060513P-0001	SDCRT-0079381
SDCRT-0011573	SDCRT-0061968	SDCRT-0079454
SDCRT-0012333	SDCRT-0062012	SDCRT-0082616
SDCRT-0013439	SDCRT-0063672	SDCRT-0083118
SDCRT-0013856	SDCRT-0063673	SDCRT-0083119
SDCRT-0016638	SDCRT-0063803	SDCRT-0083119.1
SDCRT-0020190	SDCRT-0063965	SDCRT-0083119.2
SDCRT-0020516	SDCRT-0065639	SDCRT-0086231
SDCRT-0020517	SDCRT-0065945	SDCRT-0086236
SDCRT-0020549	SDCRT-0066018	SDCRT-0086256
SDCRT-0020688	SDCRT-0066089	SDCRT-0086292
SDCRT-0020884	SDCRT-0066158	SDCRT-0086294
SDCRT-0021274	SDCRT-0066159	SDCRT-0086296
SDCRT-0021278	SDCRT-0066416	SDCRT-0086303
SDCRT-0021338	SDCRT-0066472	SDCRT-0086309
SDCRT-0021359	SDCRT-0066492	SDCRT-0086313
SDCRT-0022235	SDCRT-0067744	SDCRT-0086318
SDCRT-0022272	SDCRT-0068746	SDCRT-0086332
SDCRT-0022449	SDCRT-0068880	SDCRT-0086341
SDCRT-0022644	SDCRT-0069645	SDCRT-0086347
SDCRT-0022644	SDCRT-0071229	SDCRT-0086356
SDCRT-0023958	SDCRT-0072705	SDCRT-0086359
SDCRT-0028608	SDCRT-0072779	SDCRT-0086364
SDCRT-0029337	SDCRT-0073140	SDCRT-0086416
SDCRT-0030556	SDCRT-0073616	SDCRT-0086419
SDCRT-0030670	SDCRT-0075391	SDCRT-0086421
SDCRT-0038018	SDCRT-0076382	SDCRT-0086425
SDCRT-0042754	SDCRT-0076707	SDCRT-0086427

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SDCRT-0086434	SDCRT-0087737	SDCRT-0090312
SDCRT-0086441	SDCRT-0087743	SDCRT-0090314
SDCRT-0086443	SDCRT-0087745	SDCRT-0090316
SDCRT-0086445	SDCRT-0087790	SDCRT-0090319
SDCRT-0086449	SDCRT-0087928	SDCRT-0090328
SDCRT-0086512	SDCRT-0087930	SDCRT-0090339
SDCRT-0086532	SDCRT-0087931	SDCRT-0090350
SDCRT-0086541	SDCRT-0087932	SDCRT-0090354
SDCRT-0086557	SDCRT-0087934	SDCRT-0090355
SDCRT-0086561	SDCRT-0087938	SDCRT-0091353
SDCRT-0086563	SDCRT-0087941	SDCRT-0091364
SDCRT-0086569	SDCRT-0087944	SDCRT-0091367
SDCRT-0086577	SDCRT-0087953	SDCRT-0091371
SDCRT-0086593	SDCRT-0087963	SDCRT-0091372
SDCRT-0086597	SDCRT-0088466	SDCRT-0091374
SDCRT-0086599	SDCRT-0088525	SDCRT-0091377
SDCRT-0086605	SDCRT-0088635	SDCRT-0091382
SDCRT-0086632	SDCRT-0088661	SDCRT-0091384
SDCRT-0086641	SDCRT-0088713	SDCRT-0091397
SDCRT-0086646	SDCRT-0088732	SDCRT-0091400
SDCRT-0086649	SDCRT-0088763	SDCRT-0091402
SDCRT-0086652	SDCRT-0088773	SDCRT-0091505
SDCRT-0086662	SDCRT-0088807	SDCRT-0091524
SDCRT-0086665	SDCRT-0088826	SDCRT-0091531
SDCRT-0086672	SDCRT-0088846	SDCRT-0091537
SDCRT-0086675	SDCRT-0089426	SDCRT-0091584
SDCRT-0086698	SDCRT-0090233	SDCRT-0091599
SDCRT-0086703	SDCRT-0090253	SDCRT-0091605
SDCRT-0087441	SDCRT-0090258	SDCRT-0091616
SDCRT-0087662	SDCRT-0090278	SDCRT-0091634
SDCRT-0087667	SDCRT-0090280	SDCRT-0091643
SDCRT-0087679	SDCRT-0090283	SDCRT-0091648
SDCRT-0087694	SDCRT-0090292	SDCRT-0091656
SDCRT-0087705	SDCRT-0090299	SDCRT-0091661
SDCRT-0087708	SDCRT-0090302	SDCRT-0091668
SDCRT-0087737	SDCRT-0090306	SDCRT-0091674

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SDCRT-0091680	SEAI-CRT-00042833	TACP-CRT-00115472
SDCRT-0091687	SEAI-CRT-00050544	TAEC-CRT-00004748
SDCRT-0091692	SEAI-CRT-00059368	TAEC-CRT-00006212
SDCRT-0091703	SEAI-CRT-00061769	TAEC-CRT-00010225
SDCRT-0091710	SEAI-CRT-00062109	TAEC-CRT-00010351
SDCRT-0091715	SEAI-CRT-00071222	TAEC-CRT-00010411
SDCRT-009197	SEAI-CRT-00074731	TAEC-CRT-00011248
SDCRT-0201291	SEAI-CRT-00075559	TAEC-CRT-00016370
SDCRT-0201578	SEAI-CRT-00075842	TAEC-CRT-00016371
SDCRT-0201579	SEAI-CRT-00085285	TAEC-CRT-00016372
SDCRT-0201727	SEAI-CRT-00088186	TAEC-CRT-00016373
SDCRT-0201940	SEAI-CRT-00101961	TAEC-CRT-00018123
SDCRT-0202981	SEAI-CRT-00165559	TAEC-CRT-00021577
SDCRT-0203164	SEAI-CRT-00174183	TAEC-CRT-00023685
SDCRT-0203189	SEAI-CRT-00178170	TAEC-CRT-00041564
SDCRT-0203190	SEAI-CRT-00183467	TAEC-CRT-00041604
SDCRT-0203191	SEAI-CRT-00207761	TAEC-CRT-00041740
SDCRT-0203199	SEAI-CRT-00207850	TAEC-CRT-00042216
SDCRT-0203259	SEAI-CRT-00223186	TAEC-CRT-00042455
SDCRT-0203300	SEAI-CRT-00246797	TAEC-CRT-00042456
SDCRT-0203789	SEAI-CRT-00258562	TAEC-CRT-00042457
SDCRT-0203836	SEAI-CRT-00266328	TAEC-CRT-00042462
SDCRT-0203840	SEAI-CRT-00280247	TAEC-CRT-00042463
SDCRT-0204010	SEAI-CRT-00297564	TAEC-CRT-00049876
SDCRT-0209855	SEAI-CRT-00383647	TAEC-CRT-00054831
SDCRT-0213826	SEAI-CRT-00489368	TAEC-CRT-00055069
SDCRT-0213996	SEAI-CRT-00518902	TAEC-CRT-00056158
SDCRT-0214781	SEAI-CRT-00587793	TAEC-CRT-00065483
SDCRT-0214786	SEAI-CRT-00587817	TAEC-CRT-00065484
SDOC0483	SEAI-CRT-00639921	TAEC-CRT-00066181
SEAI-CRT-00000163	SEAI-CRT-00643131	TAEC-CRT-00069279
SEAI-CRT-00000312	SEC-CRT-00000018	TAEC-CRT-00069348
SEAI-CRT-00003951	TACP-CRT-00056285	TAEC-CRT-00070348
SEAI-CRT-00025857	TACP-CRT-00058370	TAEC-CRT-00070424
SEAI-CRT-00035855	TACP-CRT-00096471	TAEC-CRT-00071245
SEAI-CRT-00042508	TACP-CRT-00109302	TAEC-CRT-00071371

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TAEC-CRT-00071857	TSB-CRT-00045123	WM2009-58914C003176
TAEC-CRT-00071992	TSB-CRT-00061306	WM2009-58914C003206
TAEC-CRT-00079825	TSB-CRT-00061307	WM2009-58914C003207
TAEC-CRT-00083156	TSB-CRT-00061308	WM2009-58914C003217
TAEC-CRT-00085136	TSB-CRT-00061309	WM2009-58914C003222
TAEC-CRT-00089910	TSB-CRT-00061310	WM2009-58914C003223
TAEC-CRT-00089968	TSB-CRT-00061311	WM2009-58914C003289
TAEC-CRT-00116065	TSB-CRT-00061312	WM2009-58914C003537
TAEC-CRT-00116066	TSB-CRT-00061313	WM2009-58914C003643
TAEC-CRT-00124796	TSB-CRT-00061314	WM2009-58914C004257
TAIS-CRT-00000276	TSB-CRT-00061315	WM2009-58914C004713
TAIS-CRT-00000539	TSB-CRT-00061316	WM2009-58914C004749
TET-CRT-00001249	TSB-CRT-00061317	WM2009-58914C005826
TET-CRT-00002363	TUSCRTP000001320	WM2009-58914C006103
TET-CRT-00002488	TUSCRTP00001224	WM2009-58914C007350
TET-CRT-00002966	WM2009-58914C000001	WM2009-58914C007366
TET-CRT-00003403	WM2009-58914C000019	WM2009-58914C007380
TSB-CRT-00007596	WM2009-58914C000020	WM2009-58914C007436
TSB-CRT-00008017	WM2009-58914C000190	ZENCRT000001
TSB-CRT-00008068	WM2009-58914C000202	ZENCRT000044
TSB-CRT-00009884	WM2009-58914C000213	ZENCRT42-HC
TSB-CRT-00009885	WM2009-58914C000288	ZENCRT43-HC
TSB-CRT-00018808	WM2009-58914C000329	CRT-INGRAM0011-0092
TSB-CRT-00025664	WM2009-58914C000457	
TSB-CRT-00030282	WM2009-58914C000475	
TSB-CRT-00030283	WM2009-58914C001040	
TSB-CRT-00031137	WM2009-58914C001437	
TSB-CRT-00033043	WM2009-58914C001515	
TSB-CRT-00033686	WM2009-58914C002250	
TSB-CRT-00035348	WM2009-58914C002436	
TSB-CRT-00036828	WM2009-58914C002726	
TSB-CRT-00036829	WM2009-58914C002877	
TSB-CRT00036875	WM2009-58914C003124	
TSB-CRT-00038197	WM2009-58914C003132	
TSB-CRT-00038597	WM2009-58914C003174	
TSB-CRT-00042440	WM2009-58914C003175	

**Exhibit B: Documents Considered in the
Expert Report of Janet S. Netz, PhD
Part 2: Confidential Documents without Bates Numbers**

01 July 2012, Letter re: HEDUS Data Questions, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division).

03 July 2012, Amended Notice of Deposition Pursuant to Rule 30(b)(6) Deposition, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division).

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07 November 2011, Response By LGE Defendants to Direct Purchasers Plaintiff Hawel A. Hawel's, D/B/A City Electronics, Second Set of Interrogatories, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division).

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12 March 2010, Direct Purchaser Plaintiffs' Second Set of Requests for Production of Documents, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division).

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16 March 2009, Indirect Purchaser Plaintiffs' Consolidated Amended Complaint, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division).

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Alioto, Mario, 18 January 2012, Letter, IPP Discovery Status Report.

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Exhibit B: Documents Considered in the Expert Report of Janet S. Netz, PhD Part 2: Confidential Documents without Bates Numbers

Benq Corporation, Undated, CRT CMs to customers #4 Antitrust Litigation V#091222 Legal, <<CRT CMs to customers #4 Antitrust Litigation V#091222 Legal.xls>>.

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Best Buy, 2002, CRT Sale Extract 2002, <<crt_sale_extract_2002.dat>>.

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Bradshaw, Benjamin, 16 March 2012, Letter from Benjamin Bradshaw to Sylvie Kern, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division).

Buy.com, Undated, CRT Order List Produced, <<2012-03-19CRTOrderList Produced.xlsx>>.

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<<DWCRTRCVPreceivingTransactionsFileFieldDescriptions.pdf>>.

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<<DWCRTREBATrebateInformationFileFieldDescriptions.pdf>>.

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<<DWCRTSKUPitemListFileFieldDescriptions.pdf>>.

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<<DWCPNXREFcouponToSKUcrossReferenceFileFieldDescriptions.pdf>>.

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<<DWCRTPCPNPcouponTransactionsFileFieldDescriptions.pdf>>.

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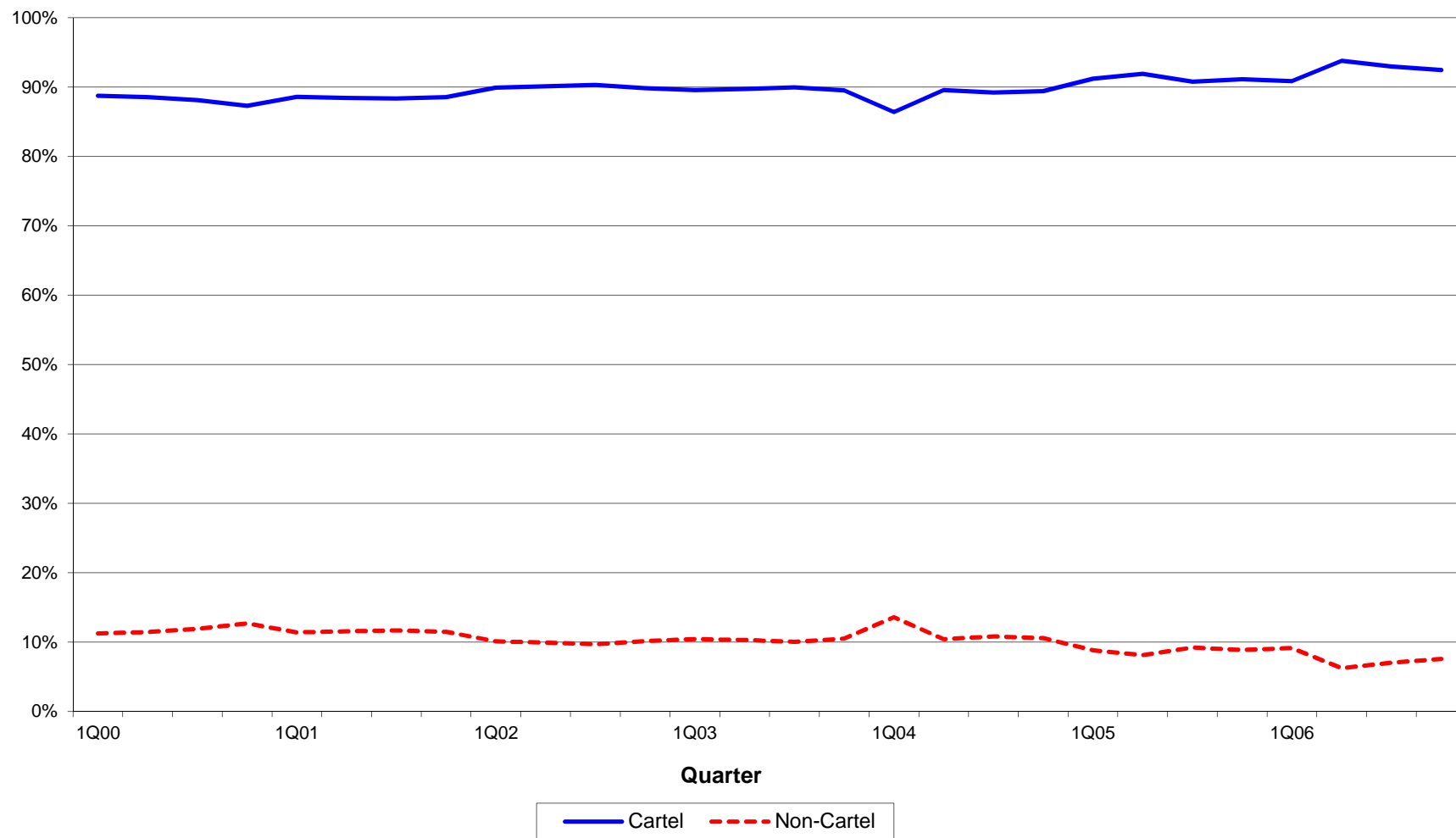
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Note(s): 4Q03 CDT data are comprised of DisplaySearch projected quantities. There are no CDT market share data for 1Q04. "Others" CDT manufacturer assumed to be Orion in 3Q05 - 4Q06 based on CDT capacity information. 4Q06 CPT information appears to be projected as of 11/2006.

Data Source(s): See Exhibits 3 and 44.

Source File(s): CRT share.do, dta creator.do, Clean Shares.xlsx

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Production Lines, by Type

Type	Maker	Country	Site	Line
CPT Only	Baoma	China	Changzhou	#1
CPT Only	BDDL	India	New Delhi	#1
CPT Only	BDDL	India	New Delhi	#2
CPT Only	Chunghwa	United Kingdom	Mossend	#1
CPT Only	Chunghwa	United Kingdom	Mossend	#2
CPT Only	Chunghwa	Malaysia	Selangor	#1
CPT Only	Chunghwa	Malaysia	Selangor	#3
CPT Only	Chunghwa	Malaysia	Selangor	#4
CPT Only	Chunghwa	Malaysia	Selangor	#9
CPT Only	Ekranas	Lithuania	Panevezys	#1
CPT Only	Ekranas	Lithuania	Panevezys	#2
CPT Only	Ekranas	Lithuania	Panevezys	#3
CPT Only	Ekranas	Lithuania	Panevezys	#4
CPT Only	Hitachi	United States	Greenville	#1
CPT Only	Hitachi	China	Shenzhen	#1
CPT Only	Hitachi	China	Shenzhen	#2
CPT Only	Hitachi	China	Shenzhen	#3
CPT Only	Hitachi	China	Shenzhen	#4
CPT Only	Hotline	India	Gwalior	#1
CPT Only	Hotline	India	Gwalior	#2
CPT Only	Hotline	India	Gwalior	#3
CPT Only	Irico	China	Xianyang	#1
CPT Only	Irico	China	Xianyang	#2
CPT Only	Irico	China	Xianyang	#3
CPT Only	Irico	China	Xianyang	#4
CPT Only	Irico	China	Xianyang	#5
CPT Only	Irico	China	Xianyang	#7
CPT Only	Irico	China	Xianyang	#8
CPT Only	Irico	China	Xianyang	#9
CPT Only	JCT	India	Chandigarh	#1
CPT Only	JCT	India	Chandigarh	#2
CPT Only	JCT	India	Chandigarh	#3
CPT Only	JCT	India	Vadadora	#1
CPT Only	JCT	India	Vadadora	#2
CPT Only	LPD	Germany	Aachen	#1
CPT Only	LPD	Germany	Aachen	#2
CPT Only	LPD	Germany	Aachen	#3
CPT Only	LPD	Spain	Barcelona	#1
CPT Only	LPD	Spain	Barcelona	#2
CPT Only	LPD	Spain	Barcelona	#3
CPT Only	LPD	China	Changsa	#1
CPT Only	LPD	China	Changsa	#2
CPT Only	LPD	China	Changsa	#3
CPT Only	LPD	Korea	Changwon	H-1
CPT Only	LPD	France	Dreux	#1
CPT Only	LPD	France	Dreux	#2
CPT Only	LPD	France	Dreux	#3
CPT Only	LPD	United Kingdom	Durham	#1
CPT Only	LPD	United Kingdom	Durham	#2

CPT Only	LPD	United Kingdom	Durham	#3
CPT Only	LPD	Mexico	Gomez (Moved From Ottawa)	A
CPT Only	LPD	Mexico	Gomez (Moved From Ottawa)	B/C
CPT Only	LPD	Mexico	Gomez (Moved From Ottawa)	D (D/C)
CPT Only	LPD	Indonesia	Jakarta	#1
CPT Only	LPD	Indonesia	Jakarta	#2
CPT Only	LPD	Korea	Kumi	A
CPT Only	LPD	Korea	Kumi	J
CPT Only	LPD	Korea	Kumi	P
CPT Only	LPD	Korea	Kumi	W
CPT Only	LPD	China	Nanjing	PL1
CPT Only	LPD	China	Nanjing	PL2
CPT Only	LPD	China	Nanjing	PL3
CPT Only	LPD	China	Nanjing	PL4
CPT Only	LPD	China	Nanjing	PL6
CPT Only	LPD	United States	Ottawa	#1
CPT Only	LPD	United States	Ottawa	#2
CPT Only	LPD	United States	Ottawa	#3
CPT Only	LPD	United States	Ottawa	#4
CPT Only	LPD	United States	Ottawa	#5
CPT Only	LPD	United States	Ottawa	#6
CPT Only	LPD	Brazil	Sao Jose Dos Campos	#1
CPT Only	LPD	Brazil	Sao Jose Dos Campos	#2
CPT Only	LPD	Brazil	Sao Jose Dos Campos	#3
CPT Only	LPD	Brazil	Sao Jose Dos Campos	#5
CPT Only	MTPD	Thailand	Bang Kadi	#2
CPT Only	MTPD	Thailand	Bang Kadi	#6
CPT Only	MTPD	China	Beijing	#1
CPT Only	MTPD	China	Beijing	#2
CPT Only	MTPD	China	Beijing	#3
CPT Only	MTPD	China	Beijing	#4
CPT Only	MTPD	China	Beijing	#5
CPT Only	MTPD	China	Beijing	#6
CPT Only	MTPD	China	Beijing	#7
CPT Only	MTPD	Germany	Esslingen	#1
CPT Only	MTPD	Germany	Esslingen	#2
CPT Only	MTPD	Japan	Himeji	#2
CPT Only	MTPD	Japan	Himeji	#3
CPT Only	MTPD	United States	Horseheads	#1
CPT Only	MTPD	Indonesia	Jakarta	#1
CPT Only	MTPD	Indonesia	Jakarta	#2
CPT Only	MTPD	Malaysia	Selangor	#1
CPT Only	MTPD	Malaysia	Selangor	#2
CPT Only	MTPD	Malaysia	Selangor	#3
CPT Only	MTPD	Malaysia	Selangor	#4
CPT Only	MTPD	Malaysia	Selangor	#5
CPT Only	MTPD	Malaysia	Selangor	#6
CPT Only	MTPD	Japan	Takatsuki	#2
CPT Only	MTPD	United States	Troy	#1
CPT Only	MTPD	United States	Troy	#2
CPT Only	MTPD	United States	Troy	#3
CPT Only	MTPD	United States	Troy	#4

CPT Only	MTPD	Japan	Utsunomiya	#1
CPT Only	Multi-Displays	Czech Republic	Hranice	#1
CPT Only	Multi-Displays	Czech Republic	Hranice	#2
CPT Only	Multi-Displays	Czech Republic	Hranice	#3
CPT Only	Novel	China	Shanghai	#1
CPT Only	Novel	China	Shanghai	#2
CPT Only	Novel	China	Shanghai	#3
CPT Only	Novel	China	Shanghai	#4
CPT Only	Novel	China	Shanghai	#5
CPT Only	Orion	Vietnam	Hanoi	#1
CPT Only	Orion	Vietnam	Hanoi	#2
CPT Only	Orion	Korea	Kumi	#1(ORICO-8)
CPT Only	Orion	Korea	Kumi	#2(ORICO-11)
CPT Only	Orion	Korea	Kumi	BSL
CPT Only	Orion	France	Longwy	#1
CPT Only	Orion	Mexico	Mexicali	#1
CPT Only	Samtel	India	Ghaziabad	#1
CPT Only	Samtel	India	Ghaziabad	#2
CPT Only	Samtel	India	Ghaziabad	#3
CPT Only	Samtel	India	Ghaziabad	#4
CPT Only	Samtel	India	Kota	#5
CPT Only	SDI	Germany	Berlin	#1
CPT Only	SDI	Germany	Berlin	#2
CPT Only	SDI	Korea	Busan	#7
CPT Only	SDI	Korea	Busan	#8
CPT Only	SDI	Hungary	Hungary	#1
CPT Only	SDI	Hungary	Hungary	#2
CPT Only	SDI	Malaysia	Sembilan	#1
CPT Only	SDI	Malaysia	Sembilan	#2
CPT Only	SDI	Malaysia	Sembilan	#3
CPT Only	SDI	China	Shenzhen	#1
CPT Only	SDI	China	Shenzhen	#2-ADD
CPT Only	SDI	China	Tianjin	#1
CPT Only	SDI	China	Tianjin	#3
CPT Only	SDI	Mexico	Tijuana	#1
CPT Only	SDI	Mexico	Tijuana	#2
CPT Only	Sony	United Kingdom	Bridgend	#1
CPT Only	Sony	United Kingdom	Bridgend	#2
CPT Only	Sony	United Kingdom	Bridgend	#3
CPT Only	Sony	Japan	Inazawa	#5
CPT Only	Sony	Japan	Mizunami	#2
CPT Only	Sony	United States	Pittsburgh	#1
CPT Only	Sony	United States	Pittsburgh	#2
CPT Only	Sony	United States	San Diego	#1
CPT Only	Sony	United States	San Diego	#2
CPT Only	Sony	United States	San Diego	#3
CPT Only	Sony	China	Shanghai	#1
CPT Only	Sony	China	Shanghai	#2
CPT Only	Sony	China	Shanghai	#3
CPT Only	Sony	Singapore	Tuas	#2
CPT Only	Sony	Singapore	Tuas	#3
CPT Only	Tesla	Czech Republic	Roznov	#1

CPT Only	Tesla	Czech Republic	Roznov	#2
CPT Only	Thai-CRT	Thailand	Chonburi	#1
CPT Only	Thai-CRT	Thailand	Chonburi	#2
CPT Only	Thai-CRT	Thailand	Chonburi	#3
CPT Only	Thai-CRT	Thailand	Chonburi	#4
CPT Only	Thomson	United States	Marion	#1
CPT Only	Thomson	United States	Marion	#2
CPT Only	Thomson	United States	Marion	#3
CPT Only	Thomson	United States	Marion	#4
CPT Only	Thomson	United States	Marion	#5
CPT Only	Thomson	Mexico	Mexico City	#1
CPT Only	Thomson	United States	Scranton	#1
CPT Only	Thomson	United States	Scranton	#2
CPT Only	Videocon	Italy	Anagni	#1
CPT Only	Videocon	Italy	Anagni	#2
CPT Only	Videocon	Italy	Anagni	#3
CPT Only	Videocon	Italy	Anagni	#4
CPT Only	Videocon	China	Dongguan	#1
CPT Only	Videocon	China	Dongguan	#2
CPT Only	Videocon	China	Dongguan	#3
CPT Only	Videocon	China	Foshan	#1
CPT Only	Videocon	China	Foshan	#2
CPT Only	Videocon	United States	Marion	#1
CPT Only	Videocon	United States	Marion	#2
CPT Only	Videocon	United States	Marion	#3
CPT Only	Videocon	United States	Marion	#4
CPT Only	Videocon	United States	Marion	#5
CPT Only	Videocon	Mexico	Mexicali	#1
CPT Only	Videocon	Mexico	Mexicali	#2
CPT Only	Videocon	Poland	Piaseczno	#1
CPT Only	Videocon	Poland	Piaseczno	#2
CPT Only	Videocon	Poland	Piaseczno	#3
CDT Only	Chunghwa	China	Fuzhou	#2
CDT Only	Chunghwa	China	Fuzhou	#5
CDT Only	Chunghwa	China	Fuzhou	#6
CDT Only	Chunghwa	China	Fuzhou	#7
CDT Only	Chunghwa	China	Fuzhou	#8
CDT Only	Chunghwa	Taiwan	Yangmei	#3
CDT Only	Chunghwa	Taiwan	Yangmei	#4
CDT Only	LPD	China	Changsa	#4
CDT Only	LPD	Korea	Changwon	H-3
CDT Only	LPD	Korea	Kumi	G-1
CDT Only	LPD	Korea	Kumi	T
CDT Only	LPD	Austria	Lebring	#1
CDT Only	LPD	Austria	Lebring	#2
CDT Only	LPD	Austria	Lebring	#3
CDT Only	LPD	Austria	Lebring	#4
CDT Only	LPD	China	Nanjing	DL3
CDT Only	LPD	China	Nanjing	DL4
CDT Only	LPD	China	Nanjing	DL5
CDT Only	LPD	China	Nanjing	DL6
CDT Only	LPD	China	Nanjing	DL7

CDT Only	LPD	United Kingdom	Wales	#1
CDT Only	Mitsubishi	Japan	Kyoto	#4
CDT Only	Mitsubishi	Japan	Kyoto	#5
CDT Only	Mitsubishi	Japan	Kyoto	#6
CDT Only	Mitsubishi	Mexico	Mexicali	#1
CDT Only	MTPD	Thailand	Bang Kadi	#4
CDT Only	MTPD	Japan	Fukaya	#1
CDT Only	MTPD	Japan	Fukaya	#2
CDT Only	Orion	Korea	Kumi	#3(ORICO-7)
CDT Only	Orion	Korea	Kumi	#4(ORICO-9)
CDT Only	Orion	Korea	Kumi	#5(ORICO-10)
CDT Only	Orion	Korea	Kumi	BSA
CDT Only	Orion	Mexico	Mexicali	#2
CDT Only	SDI	Korea	Busan	#3
CDT Only	SDI	Korea	Suwon	#2
CDT Only	SDI	Korea	Suwon	#3
CDT Only	SDI	China	Tianjin	#2
CDT Only	Sony	Japan	Inazawa	#1
CDT Only	Sony	Japan	Inazawa	#2
CDT Only	Sony	Japan	Inazawa	#3
CDT Only	Sony	Japan	Inazawa	#4
CDT Only	Sony	Singapore	Tuas	#4
CDT Only	TECO	Taiwan	Kguanin	#1
Switched	Chunghwa	China	Fuzhou	#1
Switched	Chunghwa	China	Fuzhou	#3
Switched	Chunghwa	China	Fuzhou	#4
Switched	Chunghwa	Malaysia	Selangor	#2
Switched	Chunghwa	Malaysia	Selangor	#5
Switched	Chunghwa	Malaysia	Selangor	#6
Switched	Chunghwa	Malaysia	Selangor	#7
Switched	Chunghwa	Malaysia	Selangor	#8
Switched	Irico	China	Xianyang	#6
Switched	LPD	China	Changsa	#5
Switched	LPD	Korea	Kumi	F-1
Switched	LPD	Korea	Kumi	F-2
Switched	LPD	China	Nanjing	DL1
Switched	LPD	China	Nanjing	DL2
Switched	LPD	China	Nanjing	PL5
Switched	MTPD	Thailand	Bang Kadi	#1
Switched	MTPD	Thailand	Bang Kadi	#3
Switched	SDI	Korea	Busan	#2
Switched	SDI	Korea	Busan	#4
Switched	SDI	Korea	Busan	#5
Switched	SDI	Korea	Busan	#6
Switched	SDI	Malaysia	Sembilan	#6
Switched	SDI	China	Shenzhen	#2
Switched	SDI	China	Shenzhen	#4
Switched	Sony	Singapore	Tuas	#1
Switched	Thai-CRT	Thailand	Rayong	#5
Hybrid	SDI	Korea	Busan	#1
Hybrid	SDI	Brazil	Manaus	#1
Hybrid	SDI	Brazil	Manaus	#2

Hybrid	SDI	Malaysia	Sembilan	#4
Hybrid	SDI	Malaysia	Sembilan	#5
Hybrid	SDI	Korea	Suwon	#1
Hybrid	Sony	Japan	Mizunami	#3
Hybrid-Switch	LPD	Korea	Changwon	H-2
Hybrid-Switch	LPD	Korea	Changwon	H-5
Hybrid-Switch	LPD	United Kingdom	Wales	#2
Hybrid-Switch	SDI	China	Shenzhen	#3

Type	Total
CPT Only	185
CDT Only	43
Switched	26
Hybrid	7
Hybrid-Switch	4

Source File(s):

line_list_by_type.do

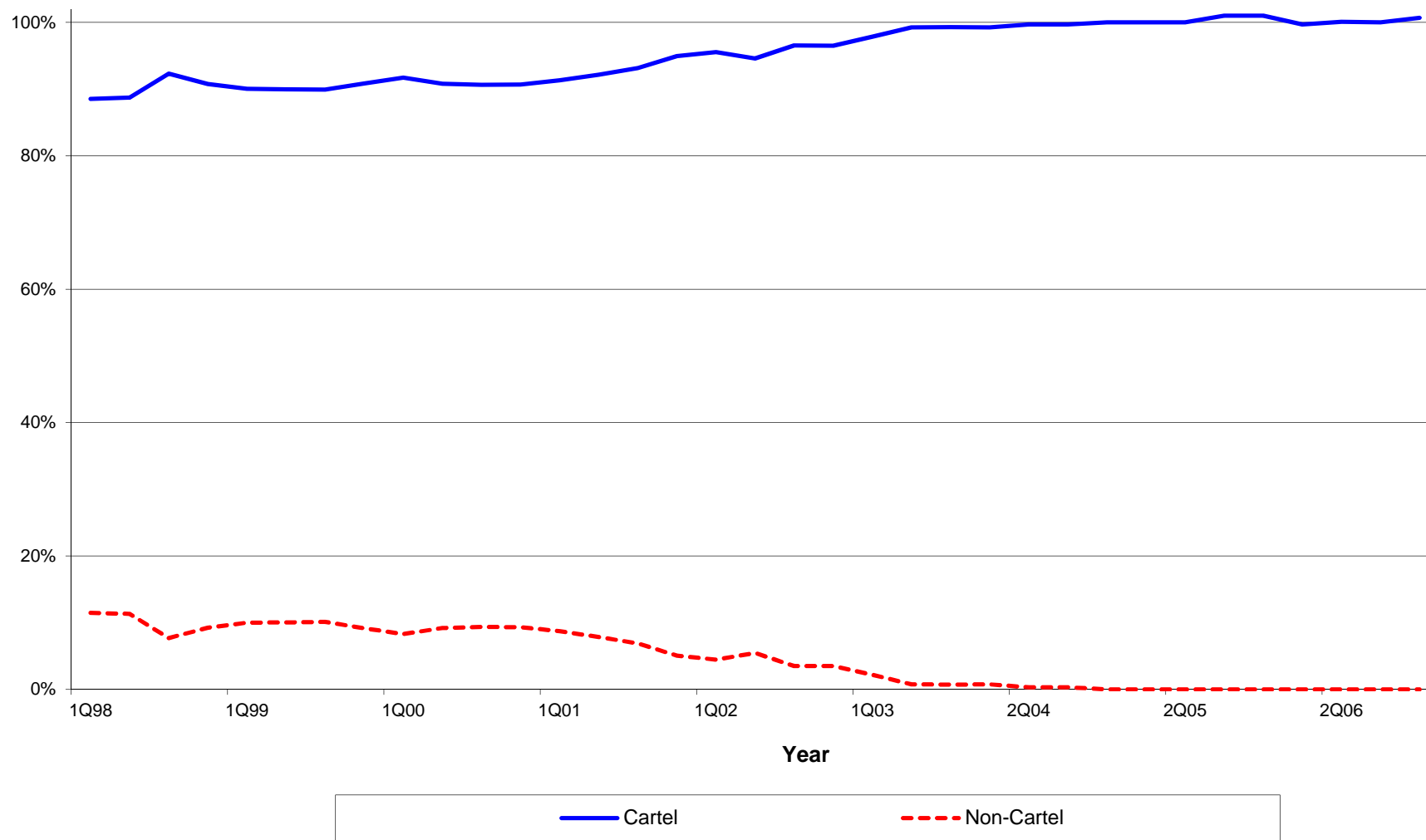
line_type.do

capacity_database.do

capacity_load.do

line_list_by_type.xlsx

Worldwide CDT Production Shares

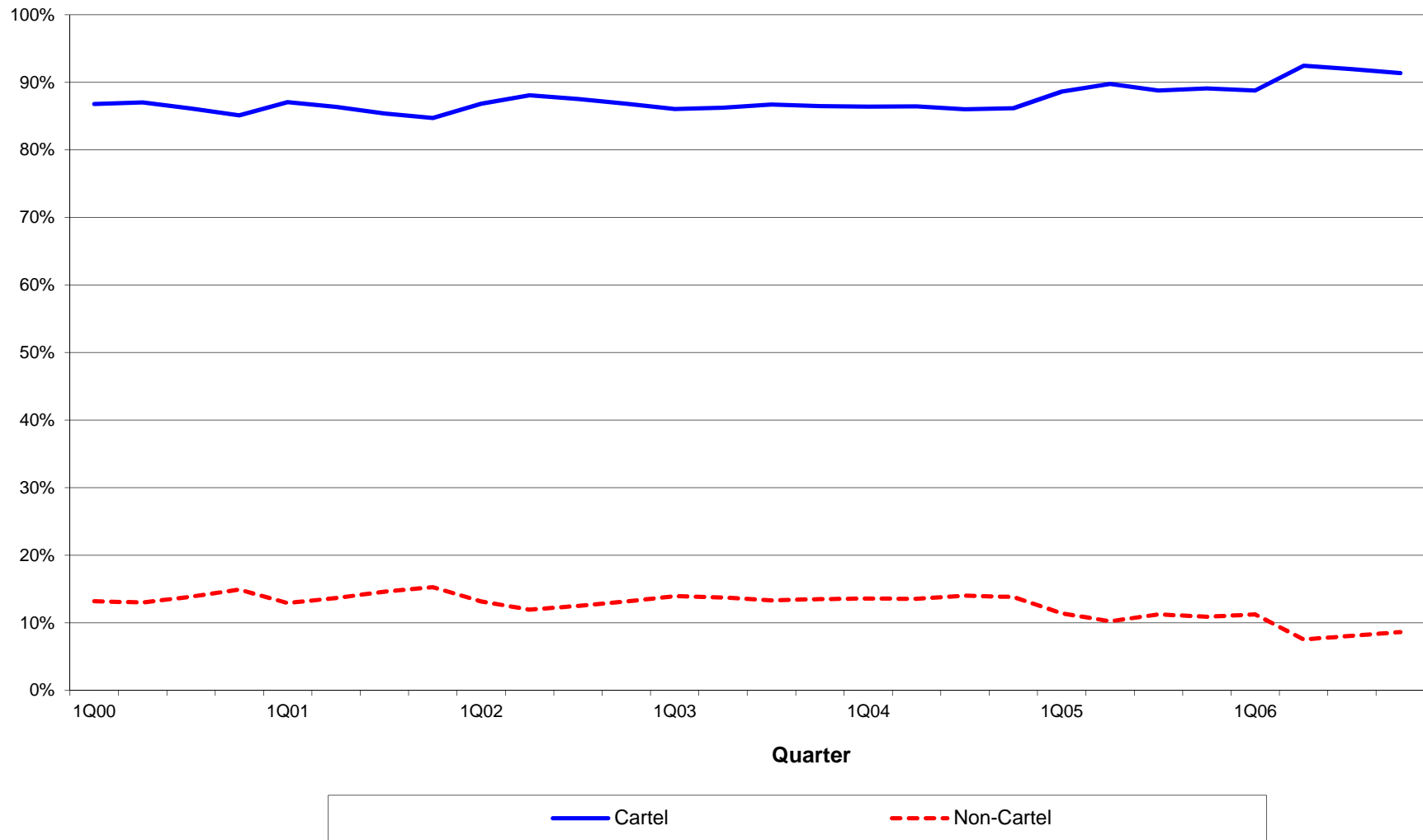


Note(s): 4Q03 CDT data are comprised of DisplaySearch projected quantities. There are no CDT market share data for 1Q04. "Others" CDT manufacturer assumed to be Orion in 3Q05 - 4Q06 based on CDT capacity information.

Data Source(s): See Exhibits 3 and 44.

Source File(s): CDT share.do, dta creator.do; CDT Data.xlsx, Clean Shares.xlsx

Worldwide CPT Production Shares

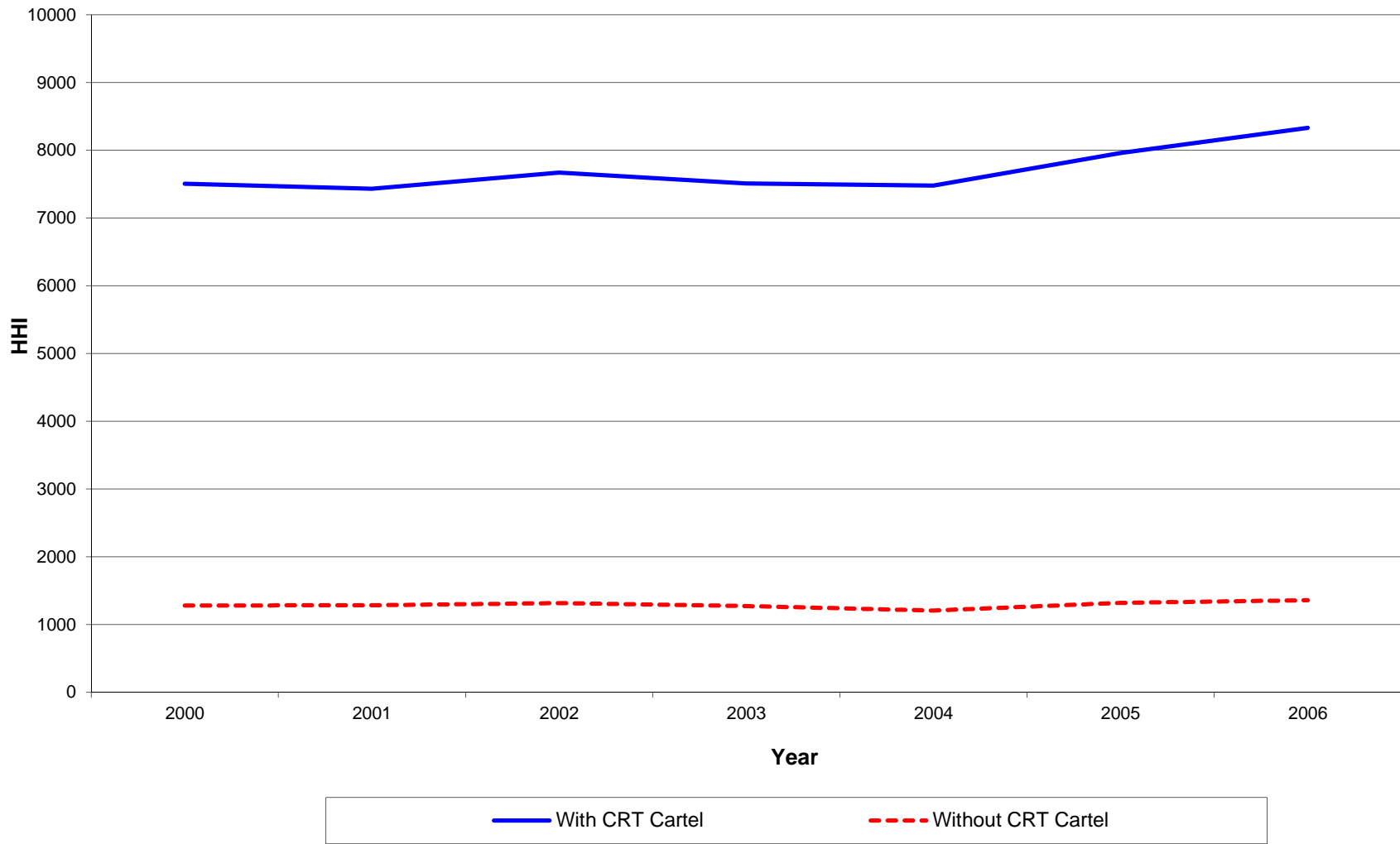


Note(s): 4Q06 CPT information appears to be projected as of 11/2006.

Data Source(s): See Exhibit 44.

Source File(s): CPT share.do; dta creator.do; Clean Shares.xlsx

HHI Over Time, Cartelized CPT Production vs. Non- Cartelized CPT Production

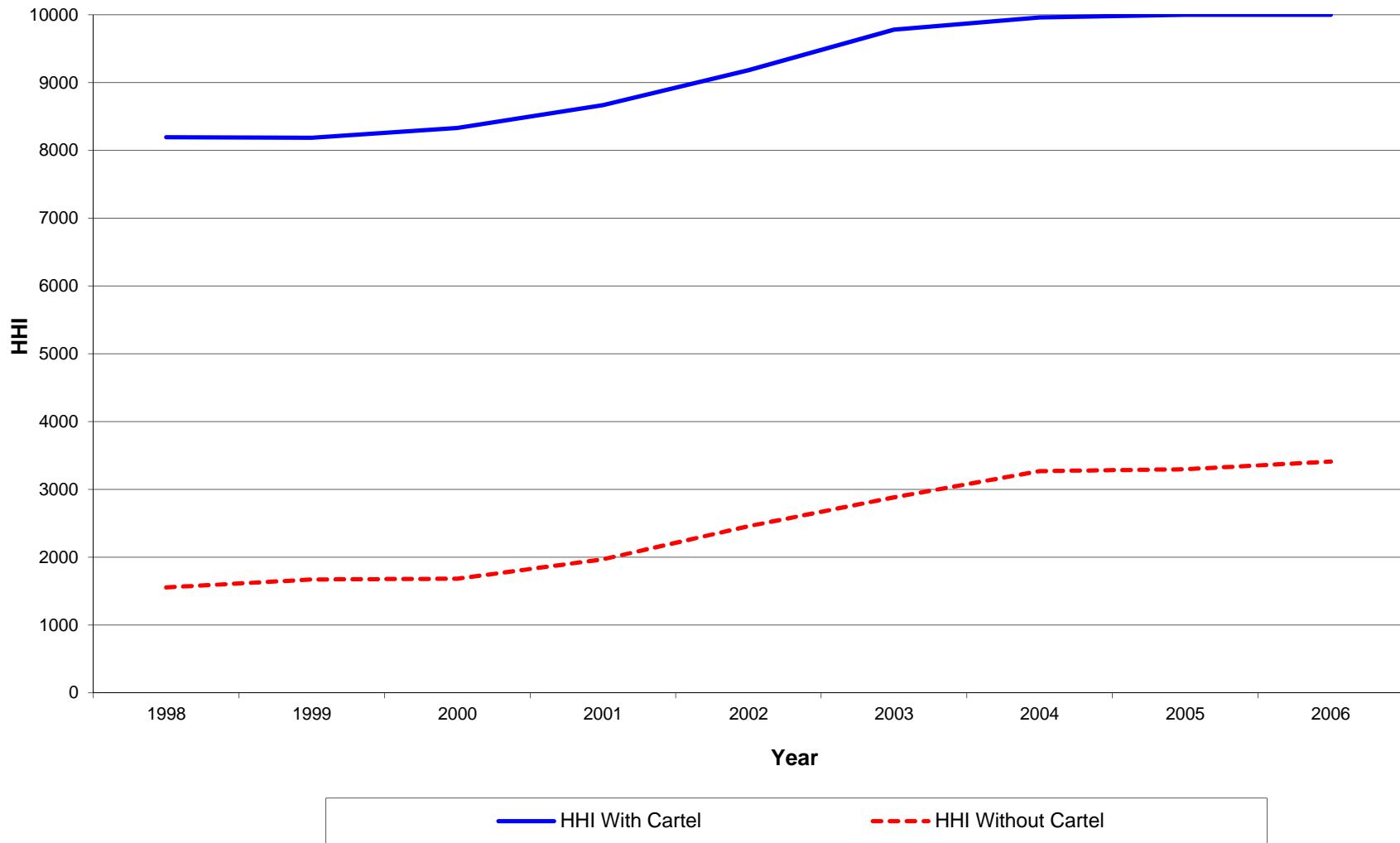


Note(s): 4Q06 CPT information appears to be projected as of 11/2006.

Data Source(s): See Exhibit 44.

Source File(s): HHI.do; dta creator.do; HHI.xlsx

HHI Over Time, Cartelized CDT Production vs. Non-Cartelized CDT Production

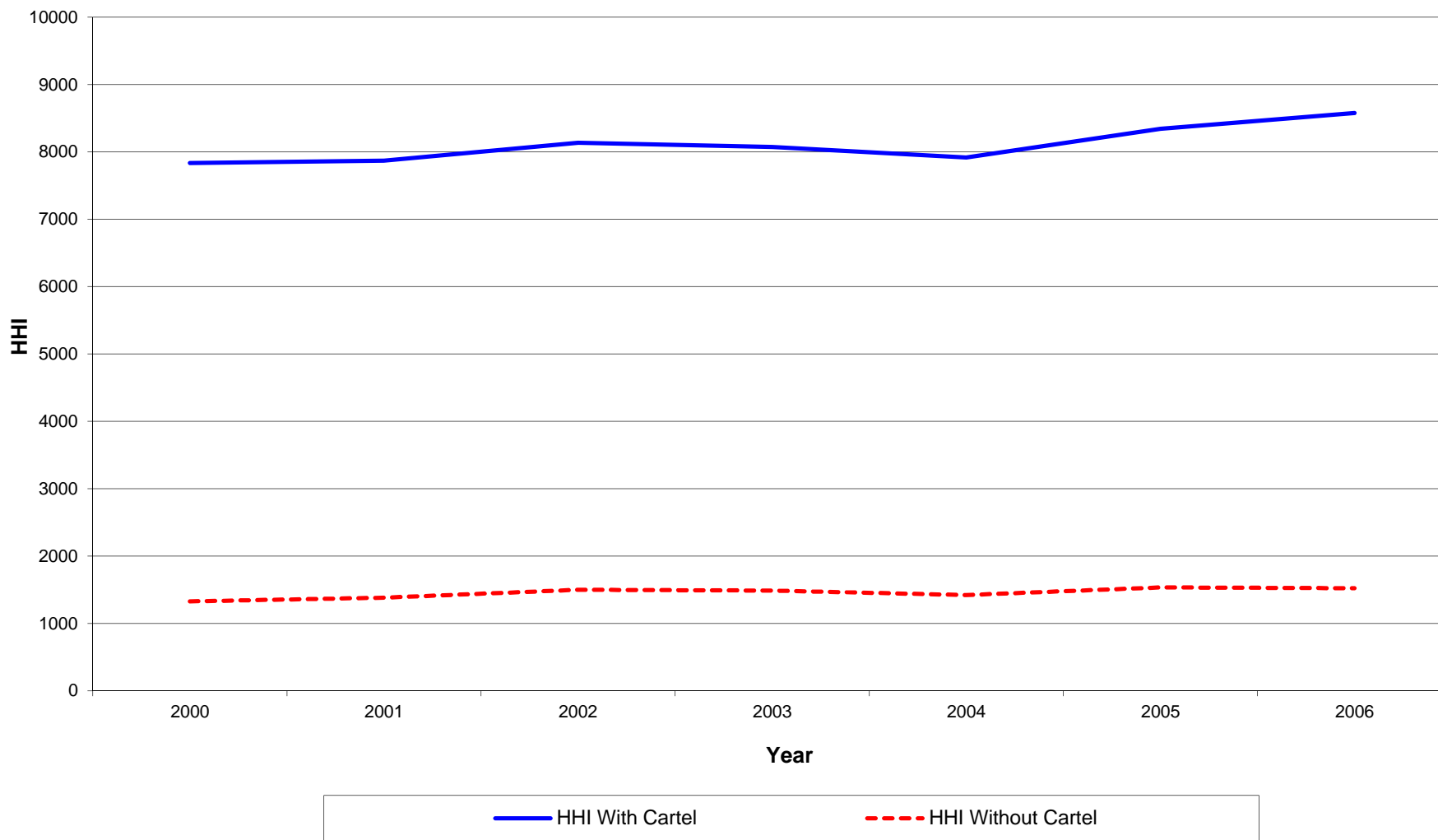


Note(s): 4Q03 CDT data are comprised of DisplaySearch projected quantities. There are no CDT market share data for 1Q04. "Others" CDT manufacturer assumed to be Orion in 3Q05 - 4Q06 based on CDT capacity information.

Data Source(s): See Exhibits 3 and 44.

Source File(s): HHI.do; dta creator.do; CDT Data.xlsx; HHI.xlsx

HHI Over Time, Cartelized CRT Production vs. Non-Cartelized CRT Production

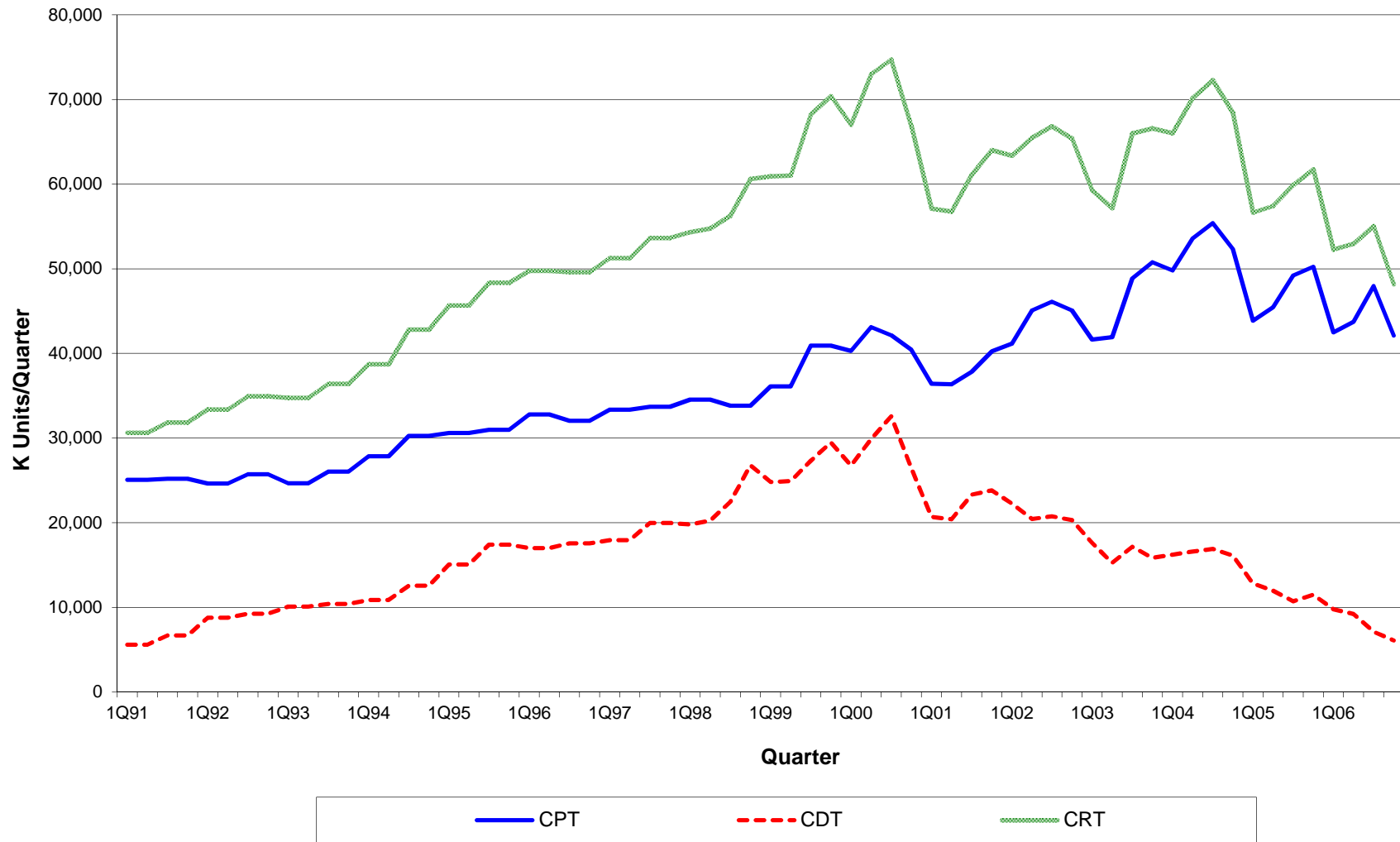


Note(s): 4Q03 CDT data are comprised of DisplaySearch projected quantities. There are no CDT market share data for 1Q04. "Others" CDT manufacturer assumed to be Orion in 3Q05 - 4Q06 based on CDT capacity information. 4Q06 CPT information appears to be projected as of 11/2006.

Data Source(s): See Exhibit 3 and 44.

Source File(s): HHI.do; dta creator.do; CDT Data.xlsx; HHI.xlsx

Total Worldwide CRT Production by Tube Type

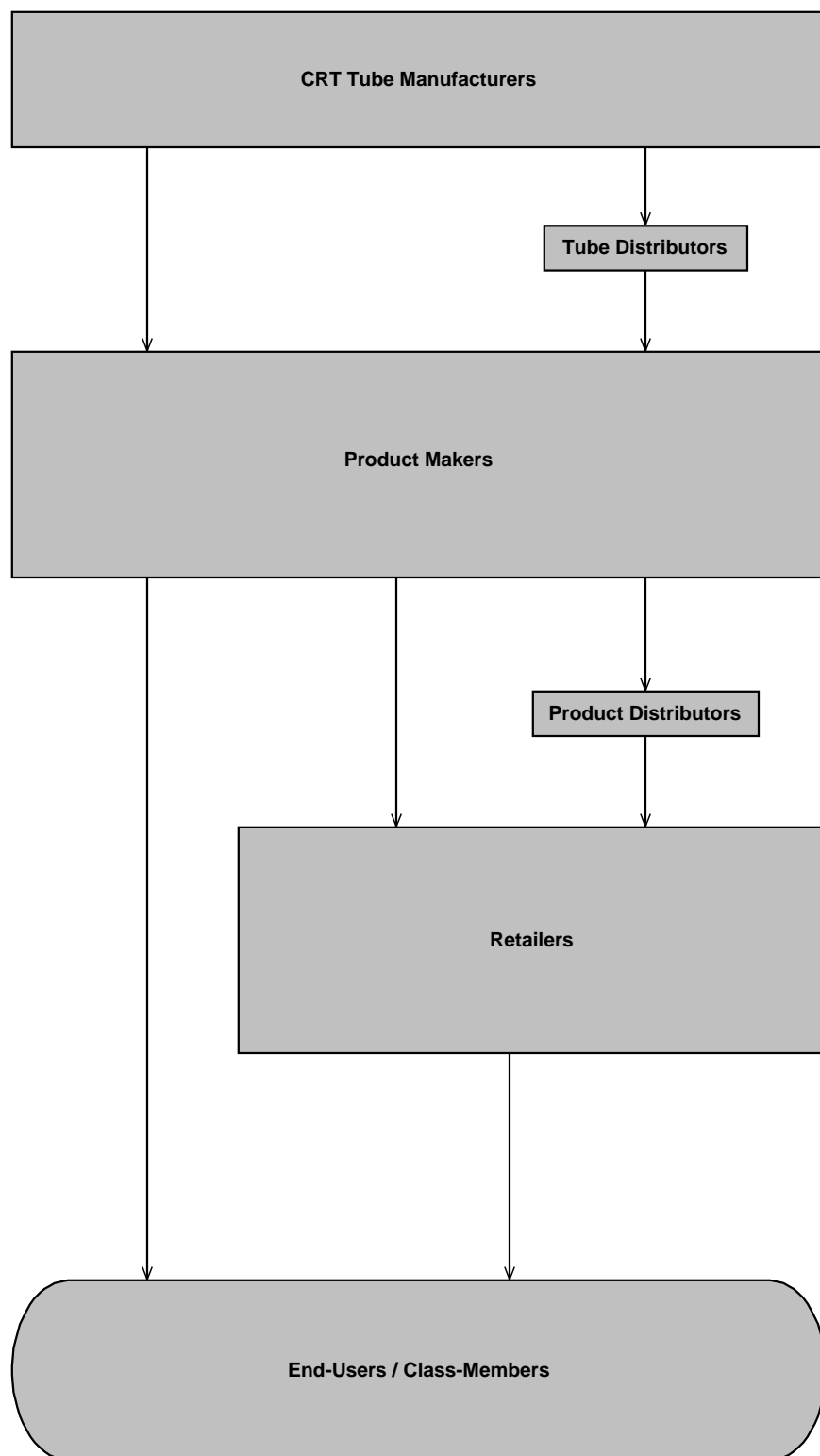


Note(s): There are no data for 1Q04 CDT; quantity value generated by taking midpoint between 4Q03 CDT and 2Q04 CDT. 4Q03 CDT data are comprised of DisplaySearch projected quantities. Data for years 1991-1997 in CDT and 1991-1999 in CPT are reported every half-year; the same values are assigned to corresponding quarters. 4Q06 CPT information appears to be projected as of 11/2006.

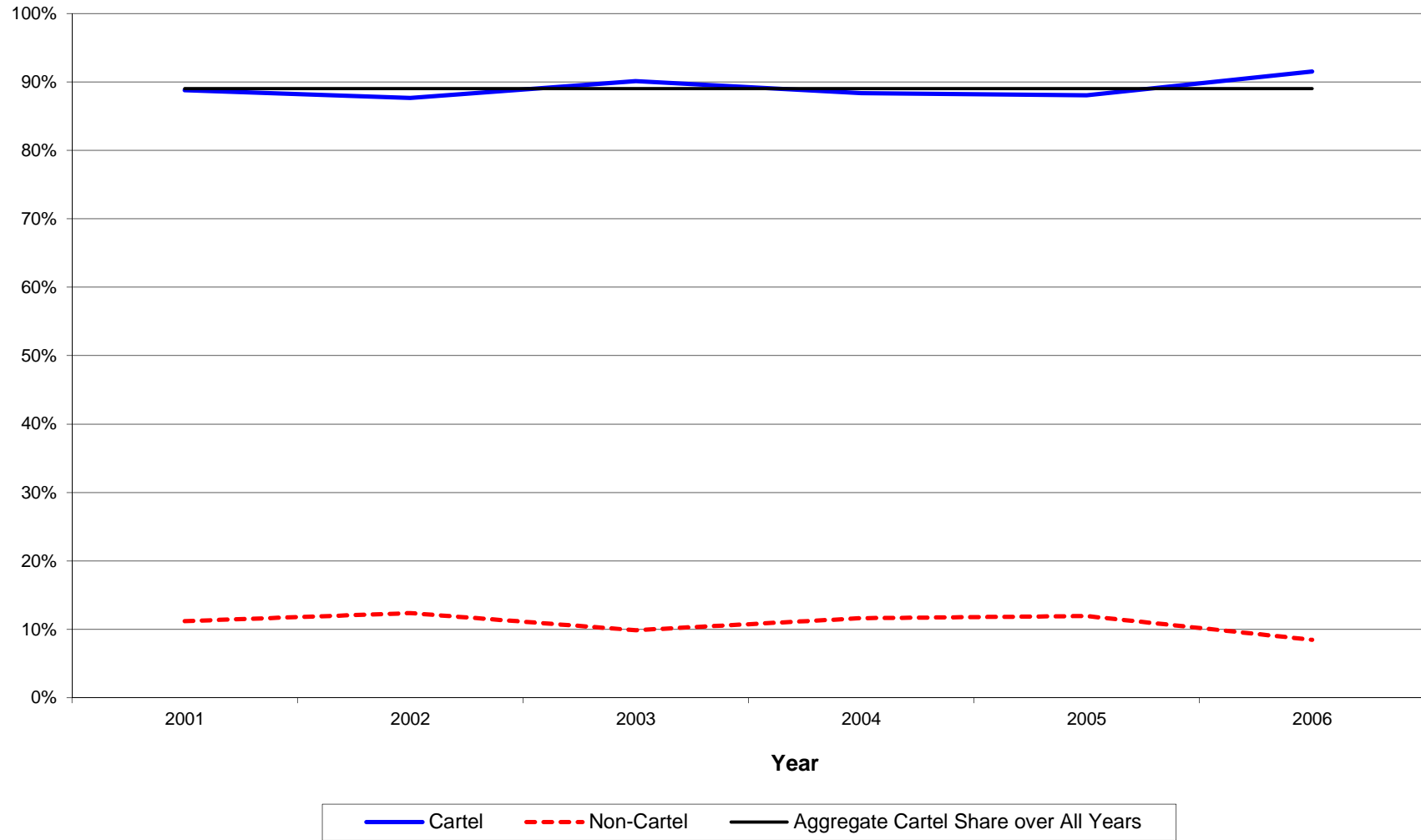
Data Source(s): See Exhibit 3.

Source File(s): total production.do; dta creator.do; total production.xlsx

CRT Distribution Diagram



Shares of Worldwide CRT Capacity



Data Source(s): See Exhibit 3.

Source File(s): capacity_shares.do; capacity_load.do; capacity_database.do; clean_defendant_capacity.xlsx

CRT Tube Sales Data

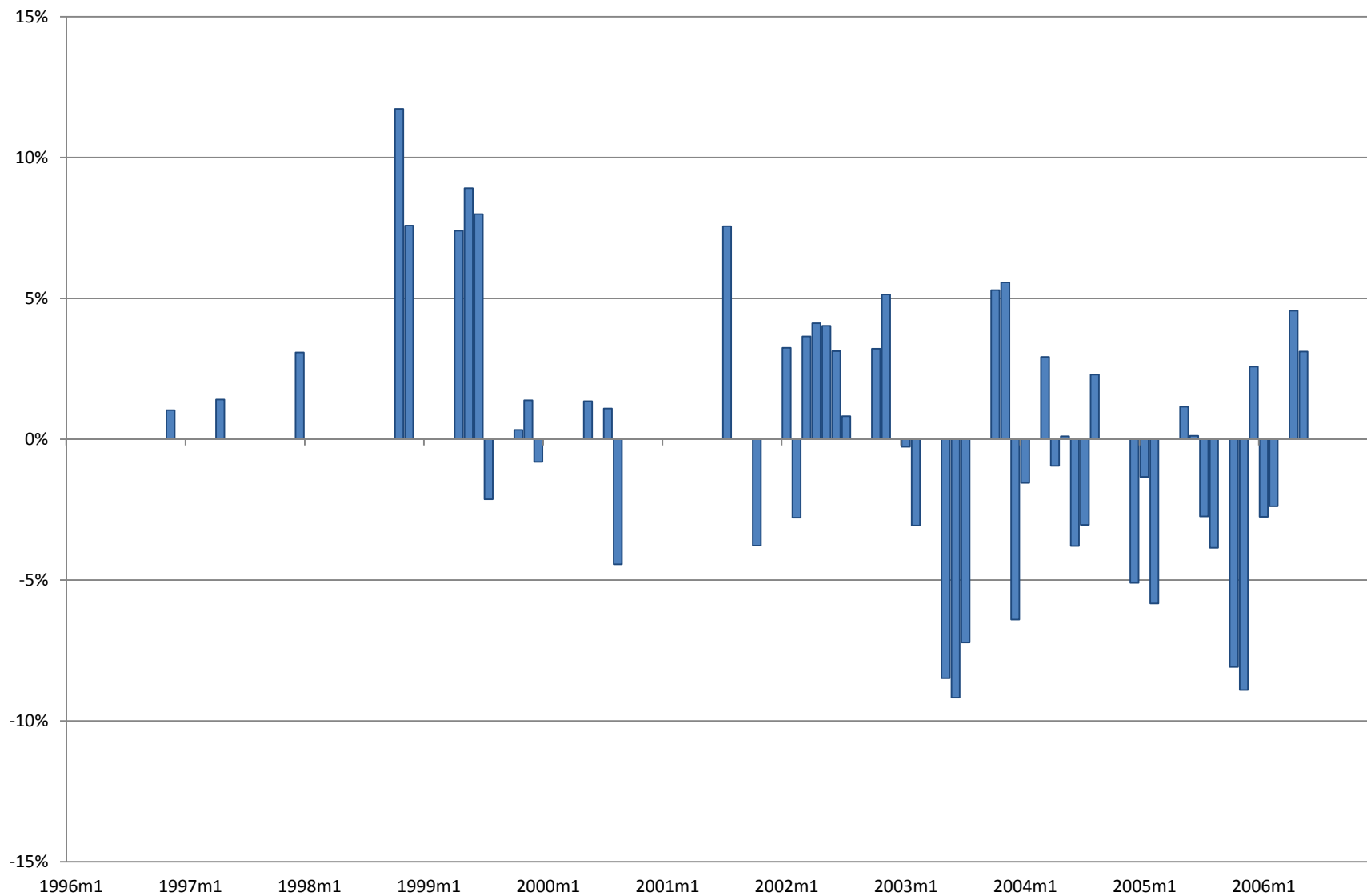
Chunghwa	Source Files	Data Files	Start Date	End Date	Granularity	Application	Size	Shape	Finish
CHWA00000001 [Headings for CPTM Transactional Records].xls	CHWA00000002.do	CHWA00000002.dta	1/3/1994	12/29/2006	Transactional	Yes	Yes	No	Yes
CHWA00000002 [CPTM Transactional Records].xls	CHWA00000005.do	CHWA00000005.dta	11/3/1997	12/29/2006	Transactional	Yes	Yes	No	Yes
CHWA00000005 [CPTF Transactional Records].xls	CHWA00000009.do	CHWA00000009.dta	1/4/1994	12/30/1998	Transactional	Yes	Yes	No	Yes
CHWA00000008 [Headings for CPTT Transactional Records 1994-1998].xls	CHWA00000011.do	CHWA00000011.dta	1/4/1994	2/27/2003	Transactional	Yes	Yes	No	Yes
CHWA00000009 [CPTT Transactional Records 1994-1998].xls	CHWA_combined.do	CHWA_combined.dta	1/3/1994	12/29/2006	Transactional	Yes	Yes	No	Yes
CHWA00000010 [Headings for CPTT Transactional Records 1999-2003].xls									
CHWA00000011 [CPTT Transactional Records 1999-2003].xls									
exchange_rates_daily.dta									
exchange_rates_monthly.dta									
Hitachi									
HEDUS-CRT00179555.xlsx	HEDUS-CRT.do	HEDUS-CRT.dta	7/18/1994	6/26/2003	Transactional	Yes	Yes	No	Yes
HDP-CRT00018516-T.xls	HDP-CRT00018516.do	HDP-CRT00018516_1995-1997.dta	1995h1	1997m1	Semiannual	Yes	No	No	No
exchange_rates_daily.dta		HDP-CRT00018516_1997-2004.dta	5/12/1997	2/21/2005	Transactional	Yes	Yes	No	Yes
exchange_rates_monthly.dta									
xchange_rates_semiannual.dta									
03 July 2012, Deposition of Hitachi Electronic Devices (USA) 30(b)(6) Witness Thomas Heiser.									
Hitachi, Undated, Specifications, HDP-CRT00018517 - HDP-CRT00018518.									
Panasonic									
MTPD-0122906.xls	MTPD-0122906.do	MTPD-0122906.dta	Jan-1994	Sep-2007	Monthly	Yes	Yes	Yes	Yes
Philips									
YTDDEC93.xlsx	Philips sales clean.do	Philips sales clean.dta	Jan-1993	Apr-1999	Monthly	Yes	Yes	No	Yes
YTDDEC94.xlsx									
YTDDEC95.xlsx									
YTDDEC96.xlsx									
YTDDEC97.xlsx									
YTDDEC98.xlsx									
YTDINVC.xlsx									
Samsung									
SDCRT-0083119.2.xlsx	SDCRT-0083119.2.do	SDCRT-0083119.2.dta	Jan-1998	Dec-2007	Monthly	Yes	Yes	Yes	Yes
aE_SDCRT-0083119.2_with_translations.xlsx									
Translations_of_customer_names.xlsx									
exchange_rates_monthly.dta									
SDI, Undated, Model of SDI CRT Product, SDCRT-0021278 - SDCRT-0021294.									
SDCRT-0021278.xlsx									

Toshiba									
TSB-CRT-00061306-317 TSB-CRT-00061306_AE_translation-TSB-CRT-00061317_AE_translation exchange_rates_daily.dta	TSB-CRT.do	TSB-CRT.dta	10/2/1995	6/24/2004	Transactional	Yes	Yes	No	Yes
All Defendants									
CHWA_combined.dta HEDUS-CRT.dta HDP-CRT00018516_1995-1997.dta HDP-CRT00018516_1997-2004.dta MTPD-0122906.dta Philips sales clean.dta SDCRT-0083119.2.dta TSB-CRT.dta	all_defendants_price.do	all_defendants_dropexout.dta							

Note(s):

Defendants use the worldwide type designation code system (WTDS) for model numbers, with the exception of SDI. Defendants have identified how to determine application, aspect ratio, size, and ITC vs. bare from the WTDS code. The defendants have not produced documentation or identified a method for pulling additional information from the family code or version component of the WTDS number.

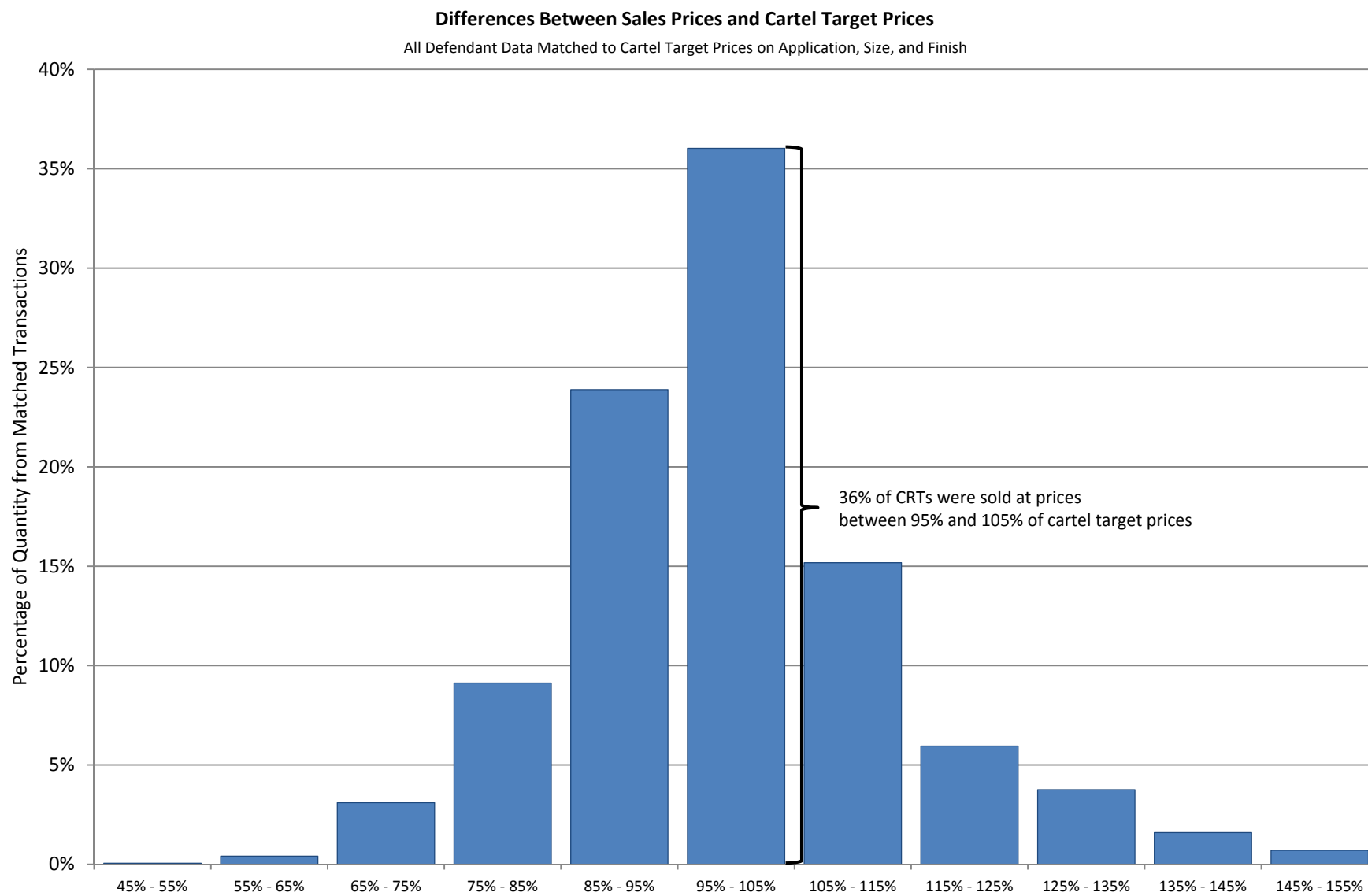
Average Difference Between Sales Price and Cartel Target Price



Note(s): Difference calculated as percentage of cartel target price

Data Source(s): See Exhibits 13 and 45, and Target price-structure.xlsx

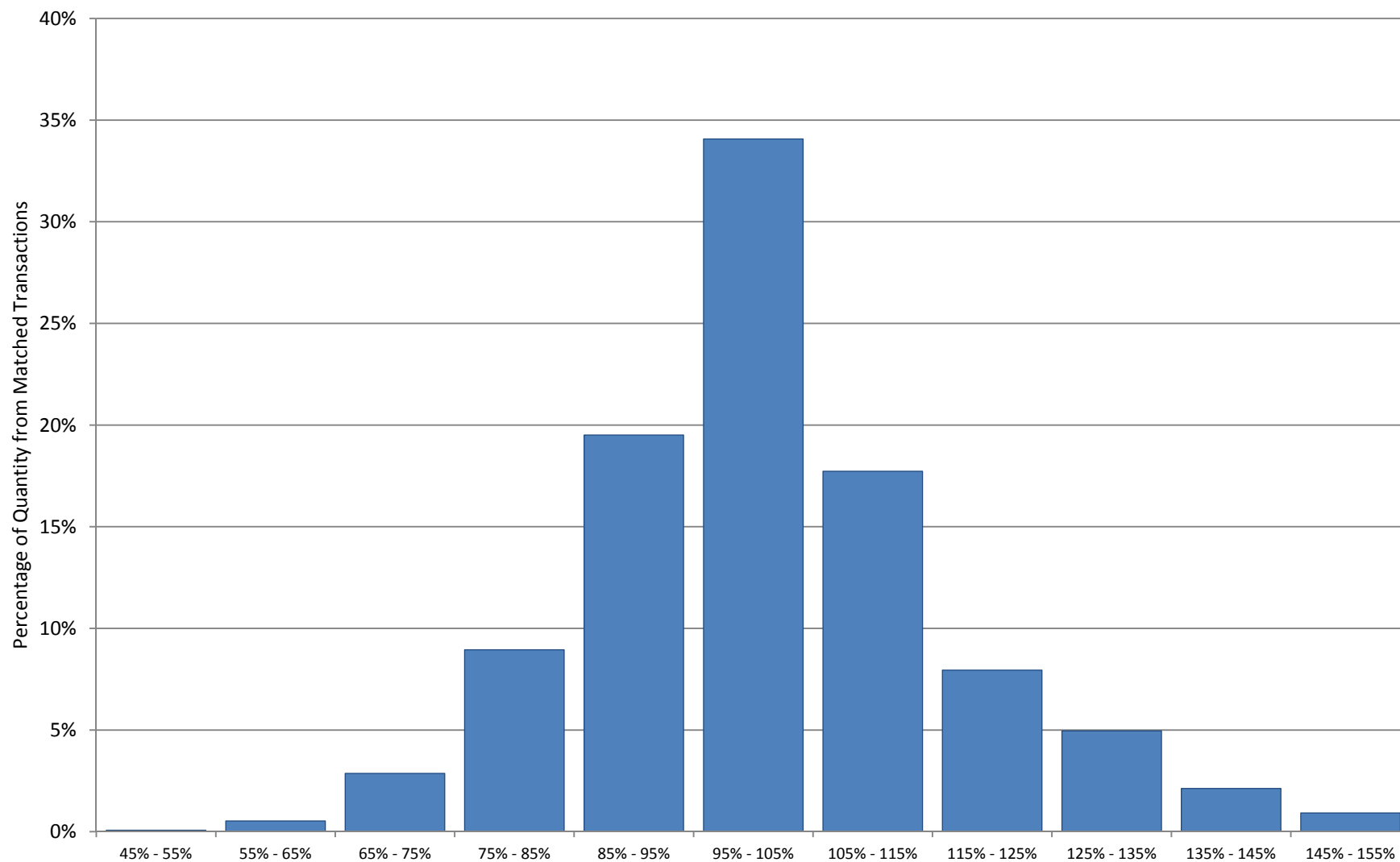
Source File(s): CleanDef.do; CleanTarget.do; PriceMatch.do



Data Source(s): See Exhibits 13 and 45, and Target price-structure.xlsx
Source File(s): CleanDef.do; CleanTarget.do; PriceMatch.do

Differences Between Sales Prices and Cartel Target Prices

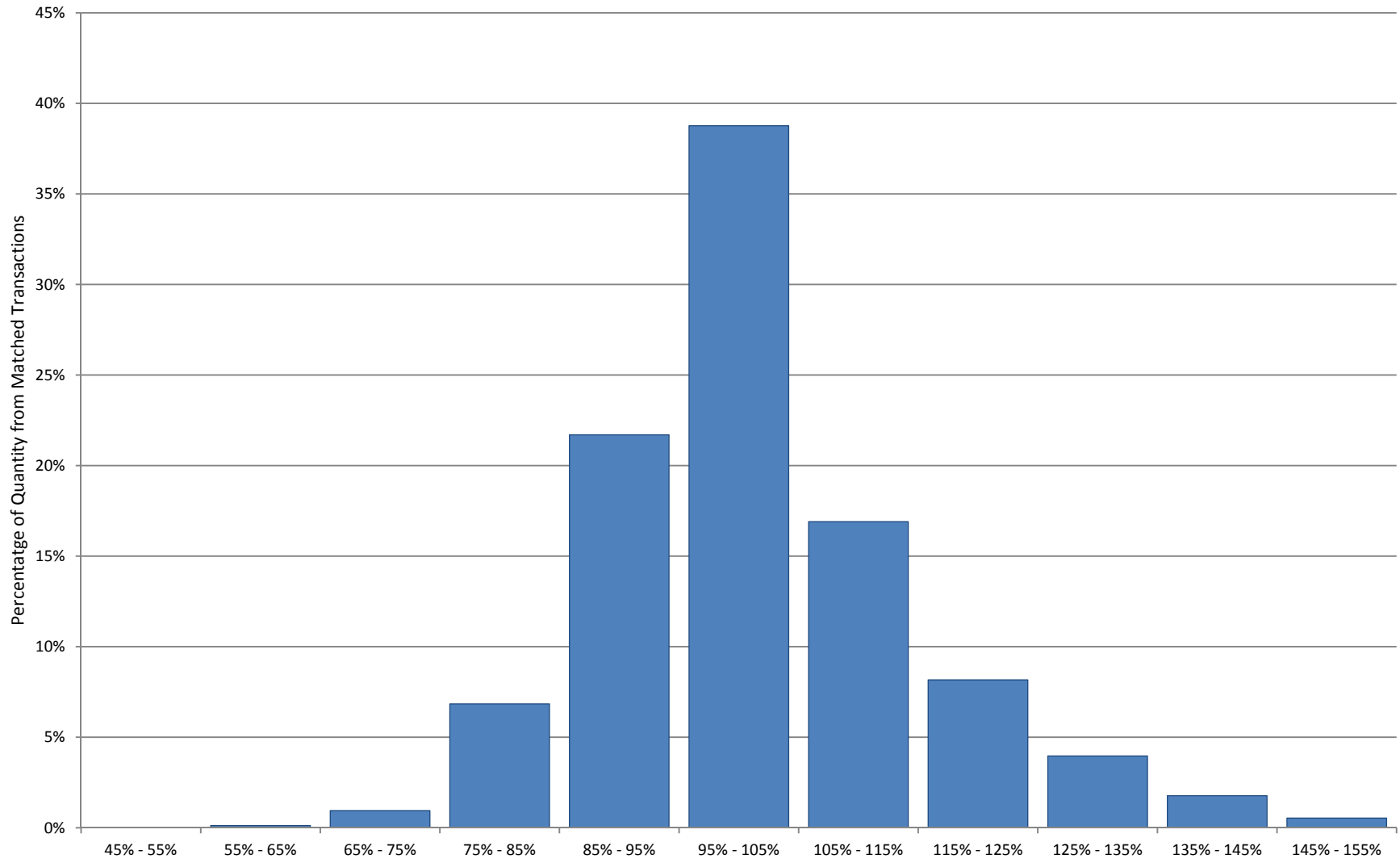
Panasonic and Samsung Data Sets Matched to Cartel Target Prices on Application, Size, and Finish



Data Source(s): See Exhibits 13 and 45, and Target price-structure.xlsx
Source File(s): CleanDef.do; CleanTarget.do; PriceMatch.do

Differences Between Sales Prices and Cartel Target Prices

Panasonic and Samsung Data Sets Matched to Cartel Target Prices on Shape, Application, Size, and Finish



Data Source(s): See Exhibits 13 and 45, and Target price-structure.xlsx

Source File(s): CleanDef.do; CleanTarget.do; PriceMatch.do

Price Differentials Set by Cartel

Price Differential	High Price Condition	Low Price Condition	Size	Base Model Shape	Meeting Date	Effective Date	Bates Number
\$2.00	Other Manufacturers	Daewoo	14	Round	1/28/1997	2/1/1997	CHU00028768
\$3.00	Samsung/Philips	Chunghwa	15	Round	5/20/1997	6/1/1997	CHU00028725
\$3.00	Samsung/Philips	Chunghwa	15	Round	5/20/1997	5/1/1997	CHU00028725
\$10.00	Short Length	Normal Length	19	Round	3/8/1999	5/1/1999	SDCRT-0086563
\$2.00	External Customers	Internal Customers	14	Round	6/23/1999	8/1/1999	SDCRT-0086641
\$2.00	Key Account	Internal Customers	15	Round	6/23/1999	8/1/1999	CHU00030787
\$2.00	Customers Outside of China and not Internal	Internal Customers	14	Round	6/23/1999	9/1/1999	CHU00030787
\$1.00	Standard Neck	Mini-neck	15	Round	6/23/1999	8/1/1999	CHU00030787
\$3.50	ITC	Bare	14	Round	8/23/1999	7/1/1999	CHU00029179
\$3.50	ITC	Bare	14	Round	8/23/1999	4/1/1999	CHU00029179
\$4.50	ITC	Bare	20	Round	8/23/1999	7/1/1999	CHU00029179
\$4.50	ITC	Bare	20	Round	8/23/1999	4/1/1999	CHU00029179
\$1.00	Normal	Mini-neck	15	Round	9/20/1999	9/20/1999	CHU00030855
\$4.00	Mini-neck	Normal (Bare)	20	Round	3/7/2000	7/1/2000	CHU00029147
\$4.50	ITC	Bare	20	Round	3/24/2000	7/1/2000	CHU00029144
\$0.30	Arrival	CIF	20	Round	3/24/2000	7/1/2000	CHU00029144
\$3.50	ITC	Bare	14	Round	3/24/2000	5/1/2000	CHU00029144
\$4.00	Mini-neck	Bare	20	Round	3/24/2000	7/1/2000	CHU00029144
\$0.30	Arrival	CIF	14	Round	3/24/2000	5/1/2000	CHU00029144
\$2.00	.25mm	.27mm	19	Round	5/26/2000	7/1/2000	CHU00031006
\$2.00	95KHz	85KHz	19	Round	5/26/2000	7/1/2000	CHU00031006
\$3.00	TCO	MPRII	19	Round	5/26/2000	7/1/2000	CHU00031006
\$1.00	TCO	MPRII	17	Round	12/28/2001	2/1/2002	CHU00031174
\$2.00	95KHz	85KHz	19	Round	12/28/2001	2/1/2002	CHU00031174
\$1.50	ITC	Non ITC	17	Round	12/28/2001	2/1/2002	CHU00031174
\$2.00	TCO	MPRII	19	Round	12/28/2001	2/1/2002	CHU00031174
\$1.00	TCO	MPRII	17	Flat	12/28/2001	2/1/2002	CHU00031174
\$2.00	ITC	Non ITC	19	Round	12/28/2001	2/1/2002	CHU00031174
\$1.00	ITC	Non ITC	15	Round	12/28/2001	2/1/2002	CHU00031174
\$1.50	ITC	Non ITC	17	Flat	12/28/2001	2/1/2002	CHU00031174
\$1.00	Other Customers	BenQ	17	Flat	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00	Other Customers	BenQ	17	Round	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00	Other Customers	Lite-on	17	Round	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00	Other Customers	AOC	17	Round	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$2.00	Other Customers	Internal Customers	17	Round	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00	Other Customers	Lite-on	15	Round	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00	Other Customers	Big Accounts	17	Round	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00	Other Customers	AOC	17	Flat	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00	Other Customers	Big Accounts	17	Flat	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00	Other Customers	BenQ	15	Round	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$2.00	Other Customers	Internal Customers	15	Round	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$2.00	Other Customers	Internal Customers	17	Flat	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00	Other Customers	Lite-on	17	Flat	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00	Other Customers	Big Accounts	15	Round	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00	Other Customers	AOC	15	Round	1/29/2002	2/1/2002	TAEC-CRT-00089968
\$1.00 - \$1.50	MPRII	Glare/Anti-glare	15	Round	10/28/2003	1/1/2004	SDCRT-0088773
\$1.50	ITC	N-ITC	17	Flat	10/28/2003	1/1/2004	SDCRT-0088773
\$1.00 - \$2.50	MPRII	Glare/Anti-glare	17	Flat	10/28/2003	1/1/2004	SDCRT-0088773
\$0.50	ITC	N-ITC	19	Flat	10/28/2003	1/1/2004	SDCRT-0088773
\$0.50	ITC	N-ITC	15	Round	10/28/2003	1/1/2004	SDCRT-0088773
\$2.00	57KHz	48KHz	15	Round	10/28/2003	1/1/2004	SDCRT-0088773
\$0.50	TCO	MPRII	17	Round	10/28/2003	1/1/2004	SDCRT-0088773
\$1.00	TCO	MPRII	19	Flat	10/28/2003	1/1/2004	SDCRT-0088773
\$1.00 - \$2.50	MPRII	Glare/Anti-glare	17	Round	10/28/2003	1/1/2004	SDCRT-0088773
\$1.00	TCO	MPRII	19	Round	10/28/2003	1/1/2004	SDCRT-0088773
\$0.50	TCO	MPRII	17	Flat	10/28/2003	1/1/2004	SDCRT-0088773
\$9.00	ITC	Bare	29	Flat	11/28/2003	10/1/2003	MTPD-0580726
\$9.00	ITC	Bare	25	Flat	11/28/2003	7/1/2003	MTPD-0580726
\$5.00	ITC	Bare	21	Flat	11/28/2003	10/1/2003	MTPD-0580726
\$9.00	ITC	Bare	25	Flat	11/28/2003	10/1/2003	MTPD-0580726
\$5.00	ITC	Bare	21	Flat	11/28/2003	7/1/2003	MTPD-0580726
\$9.00	ITC	Bare	29	Flat	11/28/2003	7/1/2003	MTPD-0580726
\$6.04	External Customers	Internal Customers	32	Flat	12/4/2003	1/1/2004	SDCRT-0088661
\$6.04	LPD	Samsung	32	Flat	12/4/2003	1/1/2004	SDCRT-0088661
\$1.50	ITC	N-ITC	19	Flat	3/25/2004	4/1/2004	CHU00031240
\$.5 - \$1	MPRII	Glare/Anti-glare	17	Round	3/25/2004	4/1/2004	CHU00031240
\$0.50	TCO	MPRII	19	Round	3/25/2004	4/1/2004	CHU00031240

\$.5 - \$1	MPRII	Glare/Anti-glare	17	Flat	3/25/2004	4/1/2004	CHU00031240
\$0.50	TCO	MPRII	17	Flat	3/25/2004	4/1/2004	CHU00031240
\$1.00	ITC	N-ITC	17	Flat	3/25/2004	4/1/2004	CHU00031240
\$1.00	TCO	MPRII	15	Round	3/25/2004	4/1/2004	CHU00031240
\$1.00	ITC	N-ITC	19	Round	3/25/2004	4/1/2004	CHU00031240
\$1.00	57KHZ	48KHZ	19	Round	3/25/2004	4/1/2004	CHU00031240
\$1.50	ITC	N-ITC	15	Round	3/25/2004	4/1/2004	CHU00031240
\$.5 - \$1	MPRII	Glare/Anti-glare	15	Round	3/25/2004	4/1/2004	CHU00031240
\$1.00	TCO	MPRII	19	Flat	3/25/2004	4/1/2004	CHU00031240
\$1.50	95KHz	85KHz	19	Flat	3/25/2004	4/1/2004	CHU00031240
\$0.50	ITC	N-ITC	17	Round	3/25/2004	4/1/2004	CHU00031240
\$0.50	Other Customers	AOC	15	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	Lite-on	19	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	AOC	19	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	ITC	N-ITC	15	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	SEC	19	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	TCO	MPRII	17	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	AOC	17	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	SEC	17	Round	6/28/2004	4/1/2004	CHU00660681
\$1.50	95KHz	85KHz	19	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	Lite-on	15	Round	6/28/2004	4/1/2004	CHU00660681
\$1.00	57KHZ	48KHZ	15	Round	6/28/2004	4/1/2004	CHU00660681
\$1.00	ITC	N-ITC	17	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	SEC	15	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	EMC	15	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	LPD	17	Round	6/28/2004	4/1/2004	CHU00660681
\$1.50	ITC	N-ITC	19	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	LPD	15	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	Lite-on	17	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	LPD	19	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	EMC	17	Round	6/28/2004	4/1/2004	CHU00660681
\$0.50	Other Customers	EMC	19	Round	6/28/2004	4/1/2004	CHU00660681
\$1.00	TCO	MPRII	19	Round	6/28/2004	4/1/2004	CHU00660681
\$4.00	ITC	Bare	20	Round	11/5/2004	1/1/2005	CHU00124930
\$2.50	ITC	Bare	14	Round	11/5/2004	1/1/2005	SDCRT-0090197
\$4.00	ITC	Bare	21	Round	11/5/2004	1/1/2005	CHU00124930
\$5.00	ITC	Bare	21	Flat	11/5/2004	1/1/2005	MTPD-0400580
\$3.00	ITC	Bare	20	Round	6/9/2005	4/1/2005	SDCRT-0091374
\$3.00	ITC	Bare	20	Round	6/9/2005	7/1/2005	CHU00029971
\$3.50	ITC	Bare	21	Round	6/9/2005	7/1/2005	CHU00029971
\$2.30	ITC	Bare	14	Round	6/9/2005	4/1/2005	SDCRT-0091374
\$4.50	ITC	Bare	21	Flat	6/9/2005	4/1/2005	SDCRT-0091374
\$4.50	ITC	Bare	21	Flat	6/9/2005	7/1/2005	CHU00029971
\$3.50	ITC	Bare	21	Round	6/9/2005	4/1/2005	SDCRT-0091374
\$2.30	ITC	Bare	14	Round	6/9/2005	7/1/2005	CHU00029971
\$3.00	Invar Mask	AK Mask	29	Flat	6/30/2005	7/1/2005	MTPD-0517933
\$4.00	ITC	Bare	21	Flat	10/21/2005	1/1/2006	MTPD-0343949
\$4.00	ITC	Bare	21	Round	12/6/2005	1/1/2006	SDCRT-0091400
\$3.50	ITC	Bare	21	Round	12/6/2005	1/1/2006	SDCRT-0091400
\$3.00	ITC	Bare	20	Round	12/6/2005	1/1/2006	SDCRT-0091400
\$2.30	ITC	Bare	14	Round	12/6/2005	1/1/2006	SDCRT-0091400
\$1.00	Invar Mask	AK Mask	15	Flat	12/12/2005	1/1/2006	MTPD-0580821
\$3.00	ITC	Bare	20	Round	3/9/2006	4/1/2006	CHU00124103
\$2.30	ITC	Bare	14	Round	3/9/2006	4/1/2006	CHU00124103
\$4.00	ITC	Bare	21	Flat	3/9/2006	4/1/2006	CHU00124103
\$3.50	ITC	Bare	21	Round	3/9/2006	4/1/2006	CHU00124103

Note(s)

The Meeting Date is the date that the cartel set the price differential or reviewed a previously set price differential. The Effective Date is the date that the cartel planned to implement the price differential.

Target Price Data Hedonics Results - All CPT Data

Number of observations 2,508
 Total R-squared 0.9807

Dependant variable is log(price)

Independent Variable	Coefficient	Standard Error	p-value (two-sided)
Time trend	-0.0064	0.0003	0.000
Time trend squared	0.0000	0.0000	0.004
15-inch tube	0.1685	0.0147	0.000
20-inch tube	0.5130	0.0027	0.000
21-inch tube	0.5695	0.0047	0.000
25-inch tube	1.0804	0.0124	0.000
28-inch tube	1.3201	0.0147	0.000
29-inch tube	1.3105	0.0089	0.000
>29-inch tube	2.1553	0.0124	0.000
ITC	0.1072	0.0024	0.000
Shape	0.2016	0.0049	0.000
Major Customer	0.0164	0.0030	0.000
Constant	3.6675	0.0133	0.000

Data Source(s):

See Target price-structure.xlsx

Source File(s):

PriceTracker.do; hedonics_data.do; hedonics_final.do

Target Price Data Hedonics Results - All CDT Data

Number of observations 1,588
 Total R-squared 0.9138

Dependant variable is log(price)

Independent Variable	Coefficient	Standard Error	p-value (two-sided)
Time trend	-0.0162	0.0004	0.000
Time trend squared	0.0000	0.0000	0.000
15-inch tube	0.3365	0.0113	0.000
17-inch tube	0.5913	0.0122	0.000
19-inch tube	0.9880	0.0138	0.000
Shape	0.0658	0.0049	0.000
Major Customer	-0.0181	0.0090	0.045
Constant	4.4668	0.0118	0.000

Data Source(s):

See Target price-structure.xlsx

Source File(s):

PriceTracker.do; hedonics_data.do; hedonics_final.do

Defendant Data Hedonics Results - All Defendant CDT Data

Number of observations	43,416
Explanatory power of product characteristics and time trends	0.7106
Explanatory power of buyer-seller pairs	0.2084
Total explained portion of variance (R^2)	0.9190
Unexplained portion of variance	0.0810

Independent Variable*	Coefficient	Standard Error	p-value (two-sided)
Time trend	-0.0116	0.0002	0.000
Time trend squared	0.0000	0.0000	0.000
10-inch tube	-0.0089	0.0244	0.715
12-inch tube	-0.7515	0.0344	0.000
14-inch tube	-1.0440	0.0191	0.000
15-inch tube	-0.8126	0.0188	0.000
16-inch tube	-0.7016	0.0246	0.000
17-inch tube	-0.4663	0.0187	0.000
19-inch tube	-0.0793	0.0187	0.000
21-inch tube	0.5643	0.0189	0.000
24-inch tube	-0.0664	0.0465	0.153
29-inch tube	0.1557	0.0302	0.000
32-inch tube	0.8063	0.0589	0.000
34-inch tube	1.0367	0.0506	0.000
36-inch tube	1.1577	0.0625	0.000
Widescreen	0.0734	0.0465	0.114
ITC	0.1459	0.0103	0.000
Knock-down	0.0317	0.0097	0.001
Constant	5.5986	0.0256	0.000

Note(s):

* Dependant variable is log(price). Coefficients for buyer-seller pairs are omitted.

Data Source(s):

See Exhibits 13 and 45.

Source File(s):

defendant_data_hedonics.do

measure_r2_effect.do

all_defendants_price.do

Defendant Data Hedonics Results - All Defendant CPT Data

Number of observations	76,900
Explanatory power of product characteristics and time trends	0.8881
Explanatory power of buyer-seller pairs	0.0757
Total explained portion of variance (R^2)	0.9638
Unexplained portion of variance	0.0362

Independent Variable*	Coefficient	Standard Error	p-value (two-sided)
Time trend	0.0021	0.0001	0.000
Time trend squared	0.0000	0.0000	0.000
10-inch tube	0.0214	0.0052	0.000
11-inch tube	-0.1490	0.0382	0.000
14-inch tube	-0.4989	0.0020	0.000
15-inch tube	-0.1211	0.0030	0.000
16-inch tube	-0.0116	0.0073	0.111
17-inch tube	0.0675	0.0048	0.000
19-inch tube	0.2958	0.0209	0.000
21-inch tube	0.1552	0.0021	0.000
24-inch tube	0.2662	0.0173	0.000
25-inch tube	0.6533	0.0033	0.000
26-inch tube	0.6247	0.0044	0.000
28-inch tube	0.6944	0.0080	0.000
29-inch tube	0.9528	0.0025	0.000
32-inch tube	1.3771	0.0094	0.000
33-inch tube	1.8907	0.0128	0.000
34-inch tube	1.7066	0.0049	0.000
36-inch tube	1.9139	0.0105	0.000
37-inch tube	2.1365	0.0352	0.000
38-inch tube	2.1296	0.0141	0.000
Widescreen	0.2938	0.0091	0.000
ITC	0.0973	0.0021	0.000
Knock-down	0.0332	0.0039	0.000
Constant	3.9053	0.0109	0.000

Note(s):

* Dependant variable is log(price). Coefficients for buyer-seller pairs are omitted.

Data Source(s):

See Exhibits 13 and 45.

Source File(s):

defendant_data_hedonics.do

measure_r2_effect.do

all_defendants_price.do

Panasonic and Samsung Data Hedonics Results - CDT Data*

	Include Shape	Exclude Shape
Number of observations	6,402	6,402
Explanatory power of product characteristics and time trends	0.8837	0.8822
Explanatory power of buyer-seller pairs	0.0599	0.0613
Total explained portion of variance (R^2)	0.9436	0.9435
Unexplained portion of variance	0.0564	0.0565

Independent Variable**	Include Shape		Exclude Shape	
	Coefficient	Standard Error	Coefficient	Standard Error
Time trend	-0.0390	0.0008	-0.0390	0.0008
Time trend squared	0.0001	0.0000	0.0001	0.0000
10-inch tube		(omitted)		(omitted)
12-inch tube		(omitted)		(omitted)
14-inch tube		(omitted)		(omitted)
15-inch tube	-1.5956	0.0266	-1.5352	0.0496
16-inch tube		(omitted)		(omitted)
17-inch tube	-1.2421	0.0168	-1.1816	0.0451
19-inch tube	-0.8459	0.0170	-0.7855	0.0452
21-inch tube		(omitted)		(omitted)
24-inch tube		(omitted)		(omitted)
29-inch tube		(omitted)		(omitted)
32-inch tube		(omitted)		(omitted)
34-inch tube		(omitted)		(omitted)
36-inch tube		(omitted)		(omitted)
Widescreen		(omitted)		(omitted)
ITC	0.1869	0.0159	0.1880	0.0160
Knock-down***	0.1237	0.0151	0.1246	0.0151
Flat screen	0.3575	0.0472		(omitted)
Constant	8.4440	0.0668	8.7994	0.0487

Note(s):

* Includes observations that indicate tube shape. Panasonic and Samsung data with shape missing are excluded.

** Dependant variable is log(price). Coefficients for buyer-seller pairs are omitted.

*** Knock-down CRTs are tubes that are sold with an uncalibrated deflection yoke.

Data Source(s):

See Exhibits 13 and 45.

Source File(s):

defendant_data_hedonics.do

measure_r2_effect.do

all_defendants_price.do

Panasonic and Samsung Data Hedonics Results - CPT Data*

	Include Shape	Exclude Shape
Number of observations	34,629	34,629
Explanatory power of product characteristics and time trends	0.9328	0.8953
Explanatory power of buyer-seller pairs	0.0380	0.0685
Total explained portion of variance (R^2)	0.9708	0.9637
Unexplained portion of variance	0.0292	0.0363

Independent Variable**	Include Shape		Exclude Shape	
	Coefficient	Standard Error	Coefficient	Standard Error
Time trend	0.0020	0.0002	0.0023	0.0002
Time trend squared	0.0000	0.0000	0.0000	0.0000
10-inch tube	0.1903	0.0167	0.0894	0.0172
11-inch tube	0.0688	0.0422	-0.1040	0.0436
14-inch tube	-0.5103	0.0026	-0.5135	0.0027
15-inch tube	-0.2923	0.0061	-0.1616	0.0063
16-inch tube	-0.0280	0.0070	-0.0140	0.0070
17-inch tube		(omitted)		(omitted)
19-inch tube		(omitted)		(omitted)
21-inch tube	0.0548	0.0027	0.1213	0.0027
24-inch tube	0.3284	0.0216	0.3085	0.0215
25-inch tube	0.5389	0.0045	0.6329	0.0048
26-inch tube		(omitted)		(omitted)
28-inch tube	0.6784	0.0095	0.6851	0.0103
29-inch tube	0.7902	0.0031	0.8481	0.0033
32-inch tube	1.3819	0.0118	1.3615	0.0128
33-inch tube	1.6418	0.0467	1.7342	0.0506
34-inch tube	1.6060	0.0087	1.6936	0.0105
36-inch tube	1.9114	0.0132	1.8898	0.0141
37-inch tube	2.0779	0.0323	2.1202	0.0364
38-inch tube	2.0412	0.0127	2.1186	0.0186
Widescreen	0.1711	0.0103	0.3361	0.0114
ITC	0.0773	0.0026	0.0822	0.0029
Knock-down	0.0181	0.0048	0.0150	0.0052
Flat screen	0.2566	0.0032		(omitted)
Constant	3.9136	0.0190	3.9043	0.0218

Note(s):

* Includes observations that indicate tube shape. Panasonic and Samsung data with shape missing are excluded.

** Dependant variable is log(price). Coefficients for buyer-seller pairs are omitted.

Data Source(s):

See Exhibits 13 and 45.

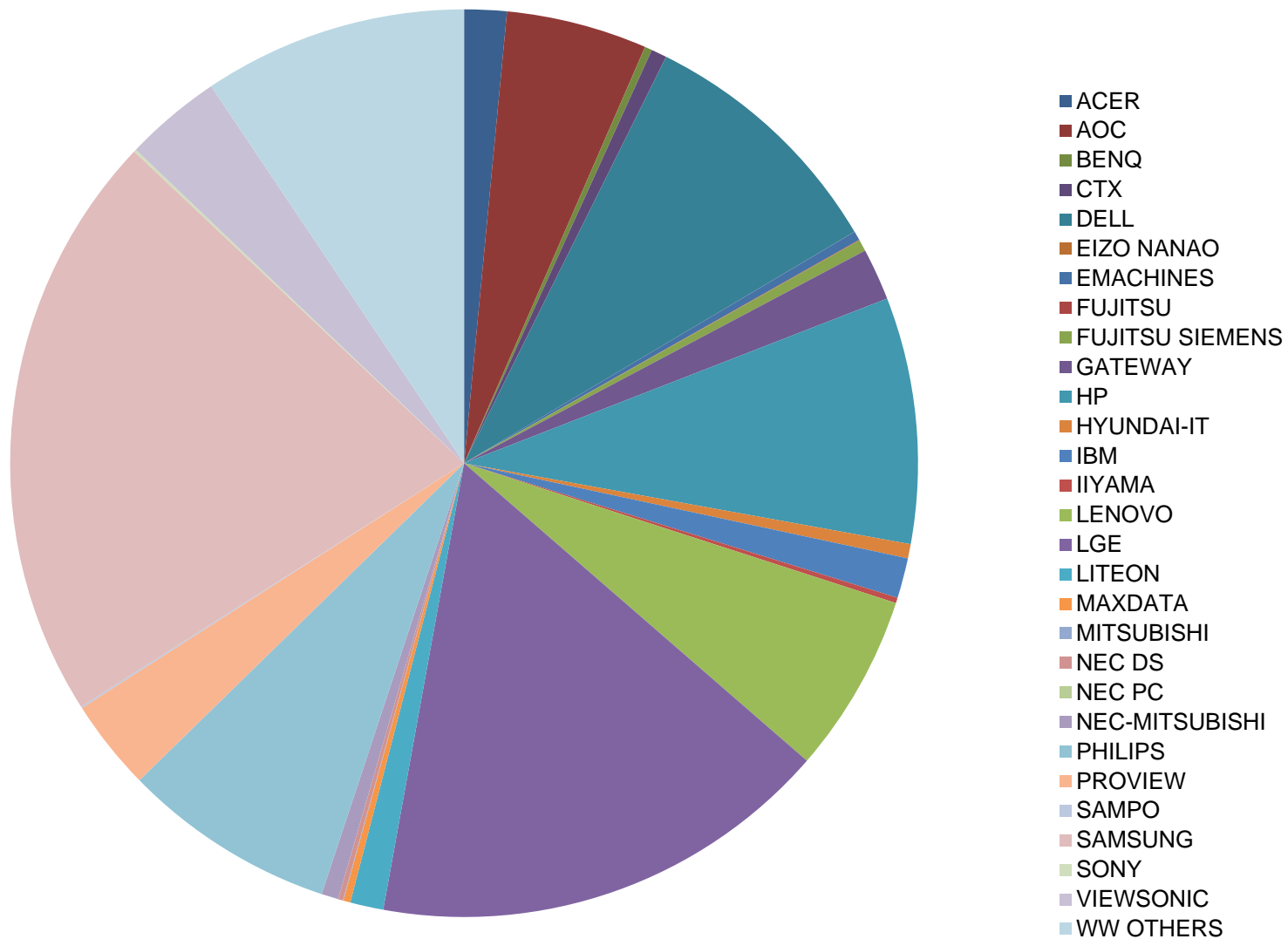
Source File(s):

defendant_data_hedonics.do

measure_r2_effect.do

all_defendants_price.do

Monitor Brand Market Shares, 2004-2006

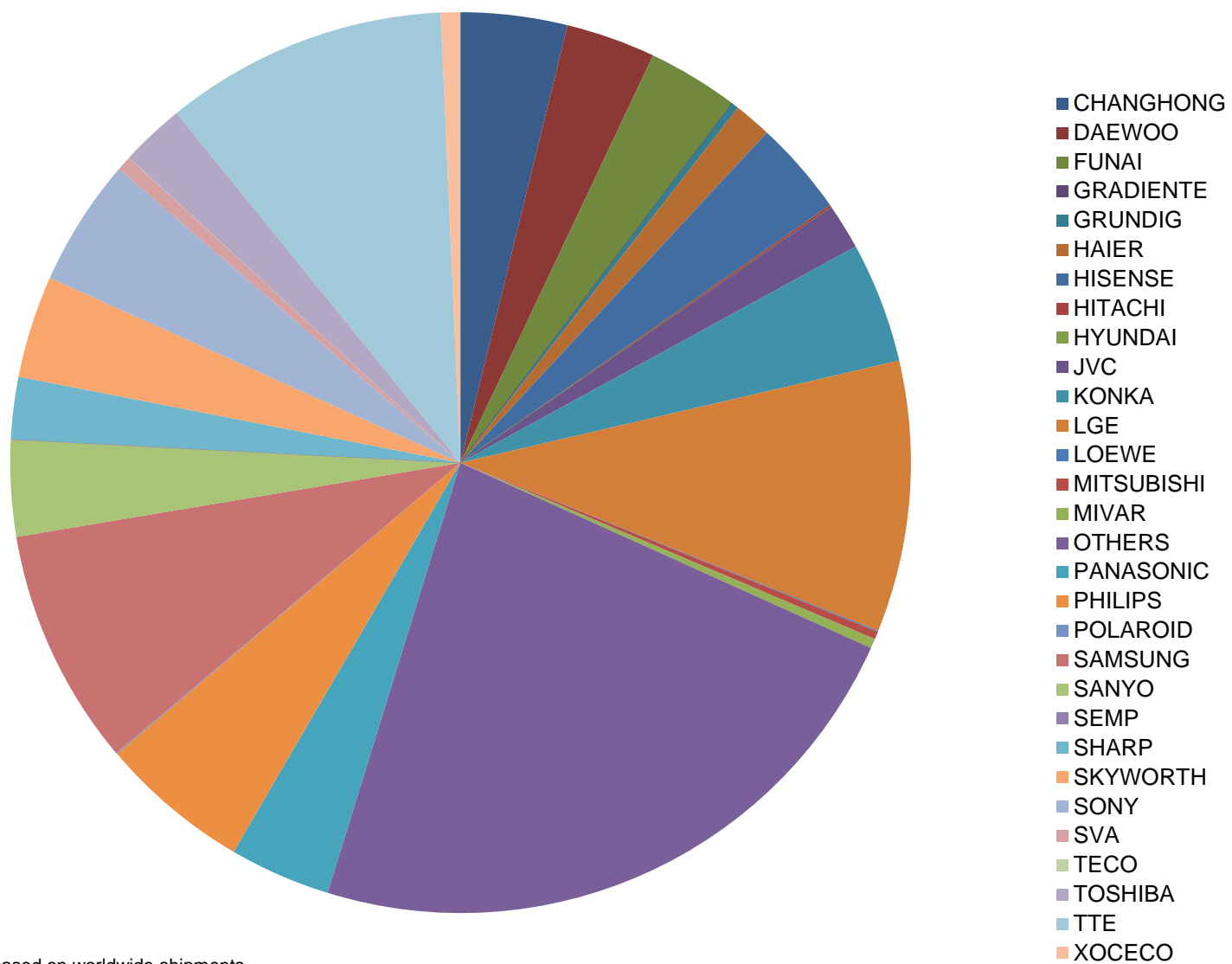


Note(s): Market shares based on worldwide shipments.

Data Source(s): DisplaySearch, 2007, Quarterly Desktop Monitor Shipment and Forecast Report, CHU00154421.

Source File(s): TV & Monitor Brand HHI.xlsx

TV Brand Market Shares, 2005-2006



Note(s): Market shares based on worldwide shipments.

Data Source(s): DisplaySearch, 2007, DisplaySearch Q2'07 Quarterly Global TV Shipment and Forecast Report, SEAI-CRT-00223186.

Source File(s): TV & Monitor Brand HHI.xlsx

Intense Competition Leads to Low Profit Rates**Trade press and financial analysts**

"The PC industry in general, and the notebook industry in particular, is not highly profitable." Foster, William, Cheng, Zhang, Dedrick, Jason, and Kenneth L. Kraemer, 2006, Technology and Organizational Factors in the Notebook Industry Supply Chain, Personal Computing Industry Center Paper 382, p. 14.

"Today, the PC business is showing all the signs of a brutal price war: rapid price cuts, rebates and lots of freebies. Dell Computer Corp., which launched the current price battle at the end of last year, now is tossing in free delivery, a free printer and free Internet access to customers who buy a PC through its Web site. That's a good thing for customers. But computer makers are reeling as the stiffening competition slices into profits" McWilliams, Gary, 26 March 2001, Price War Squeezes PC Makers --- Cuts Make Companies Bleed As Profits, Sales Decline; Some Predict a Shakeout, Wall Street Journal, Eastern Edition, p. B.1.

"That markup of nearly 50% of the total cost is a 'healthy profit margin' for Amazon, said Van Baker, a Gartner Inc. analyst, adding that most consumer products have markups of 20% to 25% of total cost. 'A markup of 50% of total cost is almost impossible to do in consumer electronics just because the market is so competitive'." Hamblen, Matt, 22 April 2009, Material costs for Kindle 2 are about half its retail price, ComputerWorld, http://www.computerworld.com/s/article/9131974/Materials_costs_for_Kindle_2_are_about_half_its_retail_price_, accessed 14 September 2012, p. 1.

"Indeed, even as consumers inexorably move toward buying ever-larger screens and retailers' revenues climb, competition is forcing price cuts. And as the low-price, high-volume mass merchants like Wal-Mart or Costco become major vendors of big-screen HDTVs, all retailers are forced to keep their prices - and their profit margins - as low as possible". Taub, Eric A., 25 August 2007, If There's A High-Definition TV in Your Future, Wait Till After the Holidays, The New York Times, <http://www.nytimes.com/2007/08/25/business/yourmoney/25TELE.html?pagewanted=all>, accessed 14 September 2012, p. 2.

Industry participants

"As a result of intense price competition in the IT products and services distribution industry, our [Ingram Micro's] gross margins have historically been narrow and we expect them to continue to be narrow in the future." Ingram Micro, 26 January 2008, Ingram Micro Form 10-K 2007, <http://www.sec.gov/Archives/edgar/data/1018003/000095013708002845/a38343e10vk.htm>, accessed 19 May 2008, p. 11.

"As a result of significant price competition in the IT [Information Technology] products and services industry, our [SYNNEX's] gross margins are low, and we expect them to continue to be low in the future." SYNNEX, 01 February 2008, SYNNEX Corporation Form 10-K 2007, <http://www.sec.gov/Archives/edgar/data/1177394/000119312508029448/d10k.htm>, accessed 19 May 2008, p. 9.

A slide from Toshiba Asia presentation states: "Market trend ... Forecast fm Y2002 [bullet] All CTV maker [sic] have been getting tired of no-profit discount competition". Toshiba, 05 July 2001, CPT World Wide Technical Engineering Meeting, TET-CRT-00002966 - TET-CRT-00002988 at 2971.

Steve Panosian of Samsung testified: "The dealers and distributors that we are doing business with today have evolved to be able to support -- sell and support higher-technology TVs and they have refined their operations to a point where they can work on lower margins, very much like we do. It is a very, very competitive business and there is a continuous squeeze on margins due to the competitiveness." 17 July 2012, Deposition of Samsung Electronic America and Samsung Electronic Corporation 30(b)(6) Witness Steve Panosian, p. 150:16-25.

"CPT President Lin indicated that raising the price on 15" not only benefits 15" CDT makers, but also gives Monitor makers the opportunity to adjust the price to create some profit margin for their no-profit-base business..." Chunghwa Picture Tubes, LTD, 23 June 1999, Business Meeting Report, CHU00030787 - CHU00030794 at 0791.01E.

High Degree of Competition in the Production of CRT Products**Trade press & financial analysts**

"Noel Leeming Group merchandise general manager Jason Bell says consumer electronics is 'one of the most competitive retail industries there is.'" Mace, William, 26 July 2010, Television prices plummet at a store near you, <http://www.stuff.co.nz/technology/digital-living/3956050/Television-prices-plummet-at-a-store-near-you>, accessed 27 July 2010, p. 1.

"DELL INC. slashed its personal-computer prices across the board; taking aim at rival Hewlett-Packard Co. and signaling a brutal new phase of competition in an industry that has just begun to pick itself off the floor." McWilliams, Gary and Tam Pui-Wing, 21 August 2003, Dell Price Cuts Put a Squeeze On Rival H-P, Wall Street Journal, Eastern Edition, pg. B.1.

"Such is the new pricing order in the hypercompetitive world of PCs." Sager, Ira, 16 November 1998, Dream Days For Desktops, BusinessWeek, <http://www.businessweek.com/1998/46/b3604022.htm> 1 of, accessed 11 April 2008, p. 1.

From UBS Investment Research: "We believe the pricing trends and sales in this holiday season will be indicative of the level of retail competition and, more importantly, consumer receptiveness to flat TVs going into 2005." UBS Investment Research, 15 December 2004, Flat TV Price Tracker #2, Global Equity Research, CHWA00032115 - CHWA00032128 at 2116.

"Today, competition in TV industry not only becomes more drastic than before but also affects the relationship between different roles in TV value chain." Hongquan, Xu, 2003, Strategy Analysis Report in China TV Market for Philips, Theseus International Management Institute, PHLP-CRT-039598 - PHLP-CRT-039648 at 9600.

CRT product manufacturers, distributors, and retailers

"Home PC sales in the U.S. serving as the warning canary for the industry, fell 24% in February, the third straight month of such declines. What's more, the drop-off also is being seen in small-business and corporate PC purchases. 'I don't see much difference across these categories right now,' says Webb McKinney, the head of Hewlett-Packard Co.'s new Business Customer Organization. 'It's very, very competitive.'" McWilliams, Gary, 26 March 2001, Price War Squeezes PC Makers --- Cuts Make Companies Bleed As Profits, Sales Decline; Some Predict a Shakeout, Wall Street Journal, Eastern Edition, p. B.1.

Retailer Best Buy states in its 1997 annual report: "Retailing in each of the Company's product categories is highly competitive". Best Buy, 28 May 1997, Best Buy Co Inc., Form 10-K 1997, <http://phx.corporate-r.net/phoenix.zhtml?c=83192&p=IROL-IRhome>, accessed 25 July 2012, p.16.

"Our [ViewSonic's] business environment is being transformed due to intense price competition." ViewSonic, 06 March 2007, ViewSonic Form 10-K 2006, <http://www.SEC.gov/Archives/edgar/data/1068806/000114036107005936/form10-k.htm>, accessed 12 July 2010, p. 22.

"The consumer electronics industry is rapidly evolving and intensely competitive." Shiming US, 15 November 2007, Shiming US Form 10-QSB 2007Q3, http://www.sec.gov/Archives/edgar/data/1091294/000114420407062954/v094113_10qsb.htm, accessed 15 May 2008, p. 19.

"The consumer electronics retail industry is highly competitive." Circuit City, 28 April 2008, Circuit City Stores, Inc. Form 10-K, <http://www.SEC.gov/Archives/edgar/data/104599/000119312508093063/>, accessed 24 July 2012 at p.9.

"As a result of intense price competition in the IT products and services distribution industry, our gross margins have historically been narrow and we expect them to continue to be narrow in the future." Ingram Micro Inc., 27 February 2008, Ingram Micro Inc. Form 10-K 2007, <http://www.SEC.gov/Archives/edgar/data/1018003/000095013708002845/a38343e10vk.htm>, accessed 24 July 2012 at p.18.

"As a result of significant price competition in the IT products and services industry, our gross margins are low, and we expect them to continue to be low in the future." Synnex Corporation, 13 February 2008, Synnex Corporation Form 10-K 2007, <http://www.SEC.gov/Archives/edgar/data/1177394/000119312508029448/d10k.htm>, accessed 24 July 2012, p.9.

"Albin F. Moschner, Zenith's president and chief executive, said the dismal second quarter resulted from brutal price competition as unit sales color televisions fell 2.3 percent in the first half of the year, instead of rising by about that amount as the industry had projected." Feder, Barnaby J., 18 July 1995, Last U.S. TV Maker Will Sell Control to Koreans, The New York Times, <http://www.nytimes.com/1995/07/18/us/last-us-tv-maker-will-sell-control-to-koreans.html?pagewanted=all&src=pm>, accessed 10 September 2012, p. 2.

Edwin Wolff of Panasonic testified: "Q. How competitive would be characterize was [sic] the market for you to resell your CRT TVs? A. Very. Frankly, it was ridiculously competitive as compared to almost any other industry you could be, I guess, in the world. I mean, it's a crazy business." 18 July 2012, Deposition of Panasonic North America 30(b)(6) Witness Edwin Wolff, p. 60:3-7.

CRT manufacturers

"In the future, how can the three makers show forth their sincerity, eliminate vicious price competition and jointly resist the price slashing of the PC brand makers and monitor OEM makers." Chunghwa Picture Tubes, LTD, 2002, CDT Market Analysis, CHU00660198 - CHU00660199 at 0198E - 0199E.

From CDT top management meeting notes: "[A]nyway, 17" monitor market price has indeed plunged below the reasonable price level of \$160 as a result of competition among monitor makers." Chunghwa Picture Tubes, LTD, 23 June 1999, Business Meeting Report, CHU00030787 - CHU00030794 at 0789.01E.

An internal Samsung e-mail regarding a meeting with retailer Best Buy states: "Competition Among Manufacturers Is Fierce & Competition Among Retailers Is Fierce." Samsung Electronics America Inc., 23 October 2006, BBY Korea Meeting Recap, SEAI-CRT-00383647 - SEAI-CRT-00383650 at 3648.

A slide from MTPD presentation states: "State of CRT/TV Industry [bullet] Fierce competition (Global)". Greg Tatusko, Undated, Clarifying Consumer TV Choices, MT Picture Display Corporation of America, MTPD-0161403, p. 11.

Defendants Indicate that Pass-Through Occurs

General Purchasing Agreement between Chunghwa Picture Tubes and Philips Consumer Electronics International states: "Supplier agrees to use commercially reasonable efforts to maximize efficiencies and realize cost reductions. Decreases in prices or cost savings will be passed along to Buyer." Chunghwa Picture Tubes, LTD, 01 January 2004, General Purchasing Agreement, CHU00628898 - CHU00628952 at 8903.

"CPT President Lin indicated that raising the price on 15" not only benefits 15" CDT makers, but also gives Monitor makers the opportunity to adjust the price to create some profit margin for their no-profit-base business..." Chunghwa Picture Tubes, LTD, 23 June 1999, Business Meeting Report, CHU00030787 - CHU00030794 at 0791.01E.

Meeting notes from a meeting between SDD, LG, Orion, Philips, and CPT indicate that industry media recognized the connection between an increase in the price of CRT tubes and an increase in the price of CRT monitors: "Conclusion: Mr. David indicated that recently the newspapers and media have repeatedly published information about the expected rise of CDT and Monitor prices. It is quite helpful for our CDT and Monitor makers to raise the prices even further in the future." Chunghwa Picture Tubes, LTD, 26 January 1999, Contact Report, CHU00030701 - CHU00030704 at 0702.01E.

Meeting notes from a meeting between CPT, SDI, LPD, and Orion state: "CDT price increase topic: CPT indicated that the \$2 price increase this time was to facilitate monitor makers' transfer of the CDT increase to customers. It will increase each size again by \$3 in April. It hopes that makers can have a common understanding and implement accordingly. Though neither SDI/LPD have objected, CPT hopes that it can progress with discussions and obtain a final decision at next month's CEO meeting." Chunghwa Picture Tubes, LTD, 22 February 2002, Visitation Report (Submit), CHU00031183 - CHU00031185 at 1184.02E.

Defendant meeting notes discuss product makers reactions to a price increase, SDI reported that product maker Delta "can gradually accept increase. Delta is also actively convincing customers to accept increase. SDI will be able to successfully increase 15":\$41 [arrow] \$43, 17":\$54 [arrow] \$56, 17"RF: \$66." Chunghwa Picture Tubes, LTD, 23 January 2002, Visitation Report, Main Topic: CDT Market Information Exchange and Price/Production Review, CHU00031180 - CHU00031181 at 1180.01E.

Meeting notes from a meeting between SDI, LG, Orion, Philips, and Chunghwa state: "Besides, addressing the customers' queries raised by CPT as to whether the Korean market would simultaneous increase the price for 15" [Underlined by hand], SDD stated that in addition to SEC accepting, export customers such as Hyundai/Daewoo have also accepted, but it would require some time for the Monitor makers to reflect the price increase to the PC system makers." Chunghwa Picture Tubes, LTD, 10 August 1999, Visitation Report, Topic: CDT Market Information Exchange and Price Review, CHU00030831 - CHU00030834 at 0831.01E.

Meeting notes from a meeting between SDI, LG, Orion, Philips, and Chunghwa state: "President Lin also indicated that 15" tube price will be raised and slightly reduce 17" tube price from August with an objective to shorten the price differential between the two and encourage the migration of market demand to 17"; since the price adjustment was just made in August, the impact has yet to be felt. It is estimated that the impact of price increase will start to be felt in the market place beginning in December." Chunghwa Picture Tubes, LTD, 20 September 1999, Visitation Report (Submit), CHU00030855 - CHU00030868 at 0855.02E - 0855.03E.

Chunghwa's notes state under Price Hike: "[W]e should also inform the customers of a possible second stage of price hike, so that they can take time to pass on to OEM customers." Chunghwa Picture Tubes, LTD, 25 March 2004, Return-from-Abroad Trip Report, CHU00031240 - CHU00031247 at 1242E.

From internal Hitachi correspondence: "Tatung/Taiwan is one of 15 inch monitor supplier to Macintosh Product Operations(US market)/Apple Computer Inc. Hitachi recently proposed price increase of 15 inch CDT to Tatung/Taiwan, who has eventually transferred this price requirement to Apple." Effler, F. Skip, 21 September 1994, Apple: 15" Monitor Price Up, HEDUS-CRT00126016 - HEDUS-CRT00126021 at 6017.

Meeting notes from a meeting between SDD, LG, Orion, Chunghwa, and Philips state: "Mr. Jerry [from Philips] claimed that he had already expressed to PH BU before the Lunar New Year that the price of 17" would be increased starting in April. PH BU has also conveyed the price increase information to Dell. Mr. Ha also claimed that its headquarters had conveyed the price increase information to SEC. SEC has also informed its customers that the sales price would be increased again." Chunghwa Picture Tubes, LTD, 19 March 1999, Visitation Report [Submitted], CHU00030731 - CHU00030733 at 0731.02E.

Meeting notes suggest an agreement on prices: "According to Mr. Kim, the current CDT price which SDD supplies to SEC, was totally in reference to the price of its major customers (such as ACER/Lite-on). Additionally, prices to customers increased again on September 1. SEC was no exception. SEC will increase sales prices to its customers (Apple, etc.) starting October 1." Chunghwa Picture Tubes, LTD, 18 September 1995, Customer Contact Report, CHU00028865 - CHU00028867 at 8867E.

Industry Participants Indicate that Pass-Through Occurs

CRT product makers

"Our [Dell's] general practice is to rapidly pass on cost declines to our customers to enhance customer value." Dell, 14 March 2008, Dell Form 10-K 2008, <http://www.SEC.gov/Archives/edgar/data/826083/000095013408005718/d55156e10vk.htm>, accessed 20 May 2008, p. 5.

In an LG Electronics USA, Inc. request for proposal to supply LCD, HD Plasma, HDTV CRT, and Digital CRT televisions to Harrah's LGE state: "Harrah's realizes that a fixed price model may not be the most equitable over time. Please provide a manner to index the price that would be tied to raw materials used in production. The price should reflect the movement of base materials." Harrah's Operating Company, Inc., 09 February 2006, Harrah's Operating Company Request for Proposal, LGE00058322 - LGE00058349 at 8339.

General Purchasing Agreement between Chunghwa Picture Tubes and Philips Consumer Electronics International states: "Supplier agrees to use commercially reasonable efforts to maximize efficiencies and realize cost reductions. Decreases in prices or cost savings will be passed along to Buyer." Chunghwa Picture Tubes, LTD, 01 January 2004, General Purchasing Agreement, CHU00628898 - CHU00628952 at 8903.

In an agreement between Dell and an unnamed supplier: "Cost Reduction. SUPPLIER shall review with Dell, on an ongoing quarterly basis, a value chain analysis for each Product, and the cost trend for the key components including currency content analysis as well as all passthrough expenses. SUPPLIER agrees that the price of the Products will be reduced in accordance with any cost reductions realized." Dell, Undated, Master Purchase Agreement [unsigned] [redacted], CHU00734954 - CHU00734957 at 4954.

Trade press

From an article regarding CDT tube price increase: "Jean [monitor maker] has indicated that CPT has already increase 3 usd per tube to them in January and as a consequence, Jean is trying to reflect such cost to their customers." David Y Chang, 22 January 2002, News from Commercial times, Taiwan, PHLP-CRT-052781 at 2781.

Market research firms

DisplaySearch report: "To calculate the CRT TV price, we used the previous quarter's tube prices to determine the current quarter's CRT TV street prices due to the lag between tube shipment and TV shipment. Thus, tube price reductions are reflected in street prices one quarter later." DisplaySearch, 12 March 2006, Quarterly TV Cost & Price Forecast Model & Report, SDCRT-0002283 - SDCRT-0002362 at 2290.

A United States International Trade Commission (USITC) report discusses the growing percentage of the CRT as a percentage of total CRT TV cost. "Because of the increasing cost of glass, the cost of tubes has risen during the period 1982-93. At the same time, the proliferation of integrated circuitry has reduced the cost of electronic television componentry other than picture tubes. Consequently, the share of television receiver cost attributable to the CRT has risen, and currently represents more than half the total unit cost of a finished color television." United States International Trade Commission, May 1995, Industry & Trade Summary: Television Picture Tubes and Other Cathode-Ray Tubes, USITC Publication 2877, http://www.usitc.gov/publications/701_731/pub3695.pdf, accessed 17 May 2012, p. 5.

CRT Makers Monitor Street Prices**Chunghwa**

From CDT meeting notes: "In addition, LG provided the information that SEC is selling 17" flat products at a low price of \$165 market price in the US market. This can be converted into FOB price of \$120 and CDT at \$70." Chunghwa Picture Tubes, LTD, 27 June 2001, Visitation Report, CHU00031142 - CHU00031147 at 1144.01E.

A spreadsheet file produced by Chunghwa contains tables with street prices of various CRT TVs by retailer. Chunghwa Picture Tubes, LTD, 20 September 2005, TV Price Summary, CHU00303245.

CPT provided a WitsView spreadsheet containing street prices of CRT TVs and monitors in October 2004. WitsView, October 2004, Street Price Survey on TV & Monitor, CHU00646093.

Chunghwa Picture Tubes presentation includes a slide containing street prices for 15" and 17" monitors. Chunghwa Picture Tubes, LTD, August 2001, Agenda, CHU00660408 - CHU00660418 at 0417.

Hitachi

Thomas Heiser of Hitachi USA testified: "Q. Okay. What's your understanding of street price? A. Street price is what the TV actually sells for. Q. Okay. And that's what the TV is sold for to the end user ultimately? A. Yes. Q. Okay. And did HED/US monitor retail prices of televisions? A. As best we could." 03 July 2012, Deposition of Hitachi Electronic Devices (USA) 30(b)(6) Witness Thomas Heiser, pp. 100-111.

Hitachi presentation includes a table titled "Calculation 21" monitors 2Q 2001". Table lists costs of CDT, Materials, Labor Cost, Sales Profit; FOB price; calculated street price; and actual street price. Hitachi, Ltd. Displays, November 2000, Hitachi Color Display Tube, HEDUS-CRT00044346 - HEDUS-CRT00044371 at 4371.

A document produced by HEDUS is a collection of printouts which list online store retail prices for various TV sets at Best Buy, Circuit City, Goodguys.com, Twitter Products, Blue Light, Sears, and Wal-Mart. Hitachi Electronic Devices (USA), 04 December 2001, Online store TV search results [print-out], HEDUS-CRT00018407 - HEDUS-CRT00018470 at 8407 - 8470.

Yasuhiro Morishima of Hitachi testified: "Q. And did Hitachi Limited monitor either street prices or retail prices for CRT monitors? A. Yes. Q. Okay. And how did it go about gathering that information? A. Well, for example, one method would be that we ask the OEM customer. And the second method would be that we, employees of Hitachi Limited, when we go on business trip to the U.S., we would just go shopping to different retail shops. And we didn't get the street price, actually, it is rather difficult to get the street price. But we would make a record as to what were the retailer's prices were, and then when we went back to Japan, we report on those." 12 July 2012, Deposition of Hitachi Displays, Ltd. 30(b)(6) Witness Yasuhiro Morishima, Volume I, pp. 75:24-76:13.

From an internal Hitachi USA letter: "Enclosed is my pricing survey from September." Several tables titled "Monitor Street Pricing - September 1994" with prices of CRT monitors at various retailers follow. Moore, Jerry, 26 October 1994, Price Survey and Other Information, HEDUS-CRT00104763 - HEDUS-CRT00104768 at 4763 - 4765.

A Hitachi document contains a slide entitled 27" Retail Pricing. Okybo, 11 September 1996, Fax, RE: HIMEX, HEDUS-CRT00146312 - HEDUS-CRT00146317 at 6315.

LG Philips

LG Philips Displays presentation contains slides with average CRT TV prices by size during December 2002 - July 2004. LG, June 2004, US Retail Channel Report, PHLP-CRT-012360, p. 5.

A spreadsheet produced by LP Philips contains tables with TV set retail prices for various sizes in years 2000-2007. LG Philips Displays, Undated, TV Set Retail Prices, LPD_00014197 at 1. LG Philips Displays, Undated, TV Set Retail Prices, LPD_00014197.

An LG Philips Displays spreadsheet contains a summary of internal data files and reports by region. Under AM (America) tab one of the data files is titled "Retail pricing survey report". Under description of contents it states: "CTV Set prices at retailers". Under frequency of update it states: "2 months". LG Philips Displays, Undated, Database and Report Summary, LPD_00013386.

LG Philips Displays presentation entitled "US Retail Channel Report" contains slides with average CRT TV prices by size during December 2002 - April 2003. LG, 23 April 2003, US Retail Channel Report, PHLP-CRT-024925, pp. 14-16.

A document produced by Philips is a compilation of reports of TV prices at various retailers, including Best Buy, Circuit City, Sears, Target, Sams Club, and Wal-Mart. Notes to the report state: "Record Price of each TV set displayed on a shelf, do not record floor models or damaged TVs." Philips, 2003, Compilation of reports with retail store TV prices, FOX00360836, pp. 1-50.

Mok Hyeon Seong of LGE testified: "Q. How did you keep track of -- of retail or street prices? MR. MUDGE: Objection. Vague. A. There is nothing we do to track those, but as I mentioned earlier, there is a periodic report published periodically by display research which contained the retail prices. Q. Okay. Why were you interested in the retail or street prices? A. That was because we needed to know where our prices came in compared to the competitors' prices." 09 July 2012, Deposition of LG Electronics 30(b)(6) Witness Mok Hyeon

"Q. Did LG Electronics or LG Electronics USA from time to time receive reports on something called the street price? A. We purchased that data." 11 July 2012, Deposition of LG Electronics 30(b)(6) Witness Yun Seok Lee, pp. 98:8-12.

Matsushita

A Beijing-Matsushita Color CRT Company document lists standard retail prices and Black Friday special prices by retailer, brand, technology, and model. Beijing-Matsushita Color CRT Company, 2003, Y2003 Black Friday Promotion Models of Display Category, BMCC-CRT000001186 at 1186.

MT Picture Display produced a document which contains street prices of CRT TVs of various sizes in 1998 through 2007. Undated, Price Spreadsheet, MTPD-0086013.

Samsung

A Samsung spreadsheet shows that SEAI considered retail margins and expected retail street pricing when setting the prices of finished products. Samsung Electronics America Inc., 2006, SEAI-CRT-00000312.

Joe Morabito of Samsung Electronics America wrote in an e-mail with the subject, "BJ's TV skus Price Survey": "Here is a price survey I do on the items carried at BJ's by all manufacturers. The last survey I did was on 10/6/06 and prices were recorded for items on the floor with active price signage." BJ's is a retail outlet that sold CRT products. Joe Moraboti, 19 October 2006, BJ's TV skus Price Survey, SEAI-CRT-00639921 at 9921.

A document produced by Samsung contains tables with TV retail price survey information. CRT-TV prices are stated for Best Buy and Circuit City. Samsung, 17 January 2006, US FTV Retail Price Survey, SDCRT-0022644.

Kim London of Samsung testified regarding tracking of street prices of finished CRT products: "Q Do you track so-called street prices at all for competitors? A. Yes. Q. And how do you do that? A. Our marketing team. Information is either given to them verbally in weekly reports based upon the GSBN system, so they do track that information." 16 July 2012, Deposition of Samsung Electronics America 30(b)(6) Witness Kim London, pp. 229:21-230:5.

A document produced by Samsung contains a list of retail prices of 134 different types of CRT-TVs at Best Buy, Circuit City, Wal-Mart, and Sears. Samsung, 27 February 2006, US CRT Price Survey (2/27/06), SDCRT-0023958.

SEAI production includes an NPD spreadsheet showing average TV retail selling prices in various US cities by technology. Listed technologies: "Plasma LCD Flat Panel", "Projection TV", "Direct View (Standard Picture Tube)", and "All Other". The NPD Group, Inc., 23 January 2007, Retail: 20-Market Comparison - Total (Market Level POS), SEAI-CRT-00042833.

Samsung Sales Strategy presentation includes a slide with 32" CRT and LCD TV prices at Walmart, Best Buy, and Sears. Samsung SDI, 05 January 2012, '2005 Sales Strategy, SDCRT-0012333, p.8.

Jaein Lee of Samsung testified: "Q. Was one of the subjects that was discussed at various CRT glass meetings was the street price of CRT monitors? A. Well, there were times when discussions of this kind occurred, but as I mentioned earlier, the -- the amount that went through the direct channel was not very large, and most of the products went to PC OEM makers." 06 June 2012, Deposition of Samsung SDI 30(b)(6) Witness Jaein Lee, Volume I, p. 154:7-21.

Toshiba

Several slides from a TAEC CDT presentation track the street prices of CDT and LCD monitors by size. Toshiba America Electronic Components, Inc., 23 July 2001, WW CDT Meeting, TAEC-CRT-00055069 - TAEC-CRT-00055130 at 5077-5082.

A Toshiba WW CDT Meeting presentation includes a "Monitor Pricing Ideas" section with a table showing average street prices by screen size during the period Q1 1998 through Q1 2001. Toshiba America, 26 April 2001, WW CDT Meeting, TAEC-CRT-00010351 - TAEC-CRT-00010410 at 0357.

In an internal Toshiba e-mail, an employee shares information about monitor prices from Compaq's website: "Looked into the latest web site, I found different information of my previous mail regarding spec on MV920 versus MV940. [paragraph] MV920 0.26/96 kHz/conventional \$574. MV940 0.26/85kHz/shortlength \$499. [paragraph] The above information is available from Compaq Homepage. Therefore, model name maybe vice versa between SEC and Lite-On. FYI, here is all consumer line monitors." A list with specifications and prices follows. Kazuya Iizuka, 27 June 2000, Re: Liteon-CPQ Consumer 19" P/J (MV940 model), TAEC-CRT-00070348 - TAEC-CRT-00070353 at 0348-0349.

Market Research Firms Monitor and Publish Street Pricing Data

DisplaySearch report from December 2006 states: "To calculate the CRT TV price, we used the previous quarter's tube prices to determine the current quarter's CRT TV street prices due to the lag between tube shipment and TV shipment. Thus, tube price reductions are reflected in street prices one quarter later". DisplaySearch, 19 December 2006, Quarterly Global TV Shipment and Forecast Report, CHU00004334 - CHU00005025 at 4355.

Among the documents produced by CPT is a WitsView spreadsheet report entitled Display Street Price Survey on TV & Monitor. Report contains street prices of CRT TVs and monitors in October 2004. CPT, October 2004, CHU00646093.

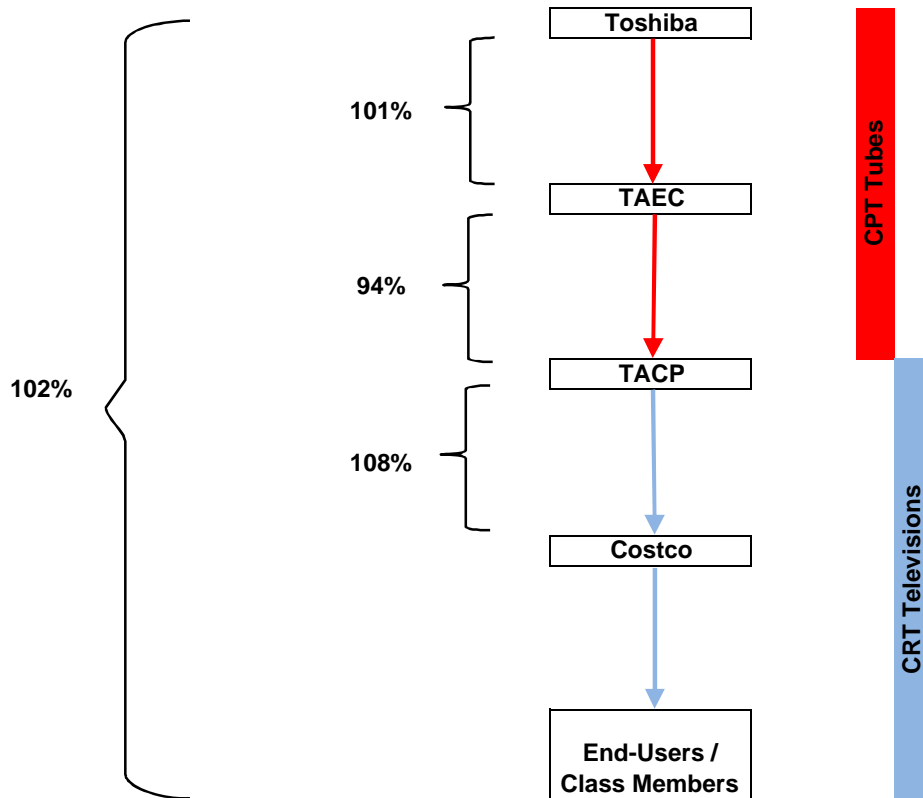
A document produced by Hitachi USA, Display Monitor report published by Meko Ltd., includes street prices of various 21" CRT monitors. Meko Ltd, 19 June 2000, Display Monitor Volume 7 No 25, HEDUS-CRT00174034 - HEDUS-CRT00174040 at 4054.

A document produced by Chunghwa, entitled "UBS Investment Research Flat TV Price Tracker #3", includes prices of CRT TVs at various US retailers. UBS Investment Research, 13 January 2005, Flat TV Price Tracker #3, Global Equity Research, CHWA00032001 . CHWA00032020 at 2004.

DisplaySearch TV Flash Reports track weekly advertised retail prices of TVs, including CRT TVs, at major retailers like Best Buy and Circuit City. Among DisplaySearch TV Flash Reports produced by Defendants are following documents:

CHWA00225304	CHWA00225707
CHWA00225321	CHWA00225735
CHWA00225357	CHWA00225766
CHWA00225376	CHWA00225825
CHWA00225402	CHWA00225848
CHWA00225419	CHWA00225908
CHWA00225447	CHWA00225931
CHWA00225465	CHWA00225970
CHWA00225485	CHWA00225988
CHWA00225513	CHWA00226020
CHWA00225530	CHWA00226040
CHWA00225548	CHWA00226056
CHWA00225581	CHWA00226082
CHWA00225597	CHWA00226132
CHWA00225612	CHWA00226162
CHWA00225635	CHWA00226189
CHWA00225663	CHWA00226208
CHWA00225689	CHWA00226236

Toshiba Top-to-Bottom Pass-Through Rate: 102%



Source File(s):
 toshiba_top_to_bottom.do
 toshiba_top_to_bottom.log
 See Exhibit 36.

Pass-Through Study Summary Results

Third Party Name	Distribution Chain Level	Product	Begin Date	End Date	Observations	Pass-through Coef.	Test Statistic	p-Value	Significance	R-Squared	Standard Error of Pass-through Coef.	Using Robust Std. Errors
Amazon	Internet Retailer	Monitors	1/2/2002	11/16/2011	15,353	1.04	2.55	0.11		0.9796	0.0219	+
Amazon	Internet Retailer	Televisions	2/8/2002	1/7/2011	20,591	1.17	417.01	0.00	***	0.9714	0.0084	+
Arrow Electronics	Product Distributor	Monitors	11/24/1997	6/26/2006	70,703	1.09	1,743.25	0.00	***	0.9748	0.0021	+
BenQ	Product Manufacturer	Monitors	11/2/1998	9/21/2005	5,037,064	1.12	84,259.55	0.00	***	0.9518	0.0004	+
Best Buy	Brick & Mortar Retailer	Monitors	3/3/2002	11/12/2009	3,285,540	1.05	11,007.73	0.00	***	0.8586	0.0005	+
Best Buy	Brick & Mortar Retailer	Televisions	3/3/2002	12/27/2009	23,460,754	1.37	550,000.00	0.00	***	0.9620	0.0005	+
Buy.com	Internet Retailer	Monitors	1/13/2002	1/28/2010	473	1.16	34.54	0.00	***	0.9945	0.0270	+
Buy.com	Internet Retailer	Televisions	9/27/2002	9/6/2010	575	1.05	55.56	0.00	***	0.9943	0.0066	+
CDW	Internet Retailer	Monitors	1/3/2006	1/8/2008	53,063	1.00	0.01	0.93		0.9325	0.0186	+
CDW	Internet Retailer	Televisions	11/8/2005	3/29/2010	5,721	1.02	0.54	0.46		0.9844	0.0279	+
Costco	Brick & Mortar Retailer	Monitors	12/16/1996	3/11/2006	569,177	1.07	29,992.74	0.00	***	0.9907	0.0004	+
Costco	Brick & Mortar Retailer	Televisions	9/3/1996	12/8/2007	7,325,920	1.07	120,000.00	0.00	***	0.9940	0.0002	+
Dell	Internet Retailer	Monitors	1/1/2002	12/31/2006	20,102,240	1.26	220,000.00	0.00	***	0.8169	0.0005	+
Fry's	Brick & Mortar Retailer	Monitors	1/1/1998	10/21/2006	1,205,681	1.13	20,095.86	0.00	***	0.9685	0.0009	+
Funai	Product Manufacturer	Televisions	1/3/2005	7/28/2009	10,958,577	1.13	450,000.00	0.00	***	0.9695	0.0002	+
Gateway	Internet Retailer	Monitors	1/5/1998	12/30/2004	582	1.12	90.41	0.00	***	0.9837	0.0124	+
Ingram Micro	Product Distributor	Monitors	12/31/2001	12/27/2010	2,646,991	1.02	5,997.89	0.00	***	0.9969	0.0003	+
Ingram Micro	Product Distributor	Televisions	12/31/2001	12/7/2010	4,960	1.03	22.19	0.00	***	0.9987	0.0070	+
OfficeMax	Brick & Mortar Retailer	Desktops	1/26/2003	12/1/2008	90,747	1.09	11.49	0.00	***	0.7920	0.0258	+
OfficeMax	Brick & Mortar Retailer	Monitors	1/26/2003	9/25/2007	231,359	1.01	6.63	0.01	**	0.7746	0.0051	+
PC Connection	Internet Retailer	Monitors	7/8/1999	10/29/2008	23,101	1.09	102.55	0.00	***	0.9786	0.0086	+
PC Connection	Internet Retailer	Televisions	2/5/1999	1/8/2007	232	1.06	14.12	0.00	***	0.9962	0.0166	
PC Mall	Internet Retailer	Desktops	6/6/2002	3/7/2006	5,638	1.01	0.55	0.46		0.9451	0.0122	+
PC Mall	Internet Retailer	Monitors	2/27/1994	6/18/2009	159,587	1.10	3,468.15	0.00	***	0.9822	0.0017	+
PC Mall	Internet Retailer	Televisions	9/24/1996	11/19/2009	2,001	1.12	25.13	0.00	***	0.9924	0.0245	+
Sam's Club (Retail Prices)	Brick & Mortar Retailer	Televisions	8/13/2001	11/19/2005	1,481	0.98	0.95	0.33		0.9998	0.0213	+
Sam's Club (Transaction Prices)	Brick & Mortar Retailer	Televisions	9/8/2001	12/17/2005	15,871	1.13	24.87	0.00	***	0.9830	0.0268	+
Tatung	Product Manufacturer	Monitors	9/2/1998	10/31/2006	222,516	1.00	0.55	0.46		0.9253	0.0059	+
Tech Data	Product Distributor	Monitors	11/3/1997	10/29/2007	1,217,901	1.00	23.32	0.00	***	0.9910	0.0005	+
Toshiba America Consumer Products (TACP)	Product Manufacturer	Televisions	4/10/1995	3/31/2006	7,500,890	1.12	50,369.97	0.00	***	0.9778	0.0005	+
Toshiba America Electronics Corporation	Tube Distributor	CDTs	4/23/1994	6/30/2000	1,881,430	0.96	3.72	0.05	*	0.9945	0.0210	++
Toshiba America Electronics Corporation	Tube Distributor	CPTs	4/19/1994	11/22/2002	13,237,937	1.00	4.45	0.04	**	0.9999	0.0015	++
Toshiba America Information Systems	Product Manufacturer	Monitors	11/1/1996	4/1/2005	4,171	1.12	0.75	0.39		0.7731	0.1411	+
Wal-Mart (Retail Prices)	Brick & Mortar Retailer	Televisions	6/23/2001	8/7/2010	1,277	1.10	4.52	0.03	**	0.9894	0.0460	+
Wal-Mart (Transaction Prices)	Brick & Mortar Retailer	Televisions	6/25/2001	8/7/2010	47,141	1.06	12.40	0.00	***	0.9863	0.0180	+
Wal-Mart/Sanyo	Brick & Mortar Retailer	Televisions	12/1/1994	8/3/2009	243	1.16	174.99	0.00	***	0.9977	0.0121	+
Zones	Internet Retailer	Desktops	1/3/2000	4/1/2003	7,175	1.13	464.03	0.00	***	0.9665	0.0060	+
Zones	Internet Retailer	Monitors	1/3/2000	1/11/2008	41,370	1.04	92.40	0.00	***	0.9712	0.0047	+
Toshiba	Top-to-bottom	Televisions	9/3/1996	2/28/2006	0	1.02	1.71	0.09	*		0.0143	+
DisplaySearch	Top-and-bottom	Televisions	2/15/2004	2/15/2006	1,326	1.24	2.98	0.08	*	0.8267	0.1385	+

Note(s):

Unless otherwise noted, the number of observations are weighted by the transaction quantity. Studies that are not weighted by transaction quantity are Gateway, Wal-Mart/Sanyo and DisplaySearch Top-and-Bottom.

Cost data is generally produced in two forms: synchronized with the sales data, or separate from the sales data.

When costs and prices (i.e. purchases and sales) are not synchronized, I calculate average costs for each product over a certain time period.

Where possible, I also conduct pass-through studies on desktop computers that are all-in-one computers featuring a built-in CRT monitors, or that are bundled with CRT monitors.

The Wal-Mart/Sanyo study uses price lists of Sanyo products sold in Wal-Mart stores. The price variable is Wal-Mart's retail price, and the cost variable is FOB costs from products sold by Sanyo Manufacturing Corporation to Wal-Mart.

The columns Begin Date and End Date represent the oldest and most recent dates for all observations in each study.

+ designates that robust standard errors are used, i.e. I conducted a Breusch-Pagan test for heteroskedasticity and this rejected the null hypothesis of no heteroskedasticity.

++ designates that standard errors allow for clustering (correlation between observations within each cluster) are used.

* designates that the pass-through coefficient is statistically significantly different than 100% at the 0.10 level.

** designates that the pass-through coefficient is statistically significantly different than 100% at the 0.05 level.

*** designates that the pass-through coefficient is statistically significantly different than 100% at the 0.01 level.

Source File(s):

See Exhibit 36

Pass-Through Study Explanatory Variable List

Third Party Name	Distribution Chain Level	Product	Price Description	Cost Description	Cost	Size	Manufacturer / Brand	Resolution	Flat Screen	HDTV	VCR Combo	DVD Combo	Time	Other Explanatory Variables
Amazon	Internet Retailer	Monitors	Transaction Prices	Synchronized	X	X	X	X						
Amazon	Internet Retailer	Televisions	Transaction Prices	Synchronized	X	X	X			X		X		
Arrow Electronics	Product Distributor	Monitors	Transaction Prices	Synchronized	X	X		X						
BenQ	Product Manufacturer	Monitors	Transaction Prices	Synchronized	X	X		X						
Best Buy	Brick & Mortar Retailer	Monitors	Transaction Prices	Synchronized	X	X			X					Wide screen.
Best Buy	Brick & Mortar Retailer	Televisions	Transaction Prices	Synchronized	X	X			X	X	X	X		Wide screen; HD-ready; Picture-in-picture.
Buy.com	Internet Retailer	Monitors	Transaction Prices	Synchronized	X	X	X	X	X					
Buy.com	Internet Retailer	Televisions	Transaction Prices	Synchronized	X	X	X	X	X	X	X	X		
CDW	Internet Retailer	Monitors	Transaction Prices	Monthly Average	X	X	X	X	X					
CDW	Internet Retailer	Televisions	Transaction Prices	Monthly Average	X	X	X	X	X	X	X	X		
Costco	Brick & Mortar Retailer	Monitors	Transaction Prices	Weekly Average	X	X	X		X					
Costco	Brick & Mortar Retailer	Televisions	Transaction Prices	Weekly Average	X	X	X		X	X	X	X		Wide screen; HD-ready; Picture-in-picture.
Dell	Internet Retailer	Monitors	Transaction Prices	Synchronized	X	X		X						
Fry's	Brick & Mortar Retailer	Monitors	Transaction Prices	Synchronized	X	X	X		X					Refurbished.
Funai	Product Manufacturer	Televisions	Transaction Prices	Monthly Average	X	X	X		X		X	X		
Gateway	Internet Retailer	Monitors	List Prices	Daily Average	X	X								
Ingram Micro	Product Distributor	Monitors	Transaction Prices	Synchronized	X	X		X	X					Wide screen.
Ingram Micro	Product Distributor	Televisions	Transaction Prices	Synchronized	X	X			X	X				Wide screen.
OfficeMax	Brick & Mortar Retailer	Desktops	Transaction Prices	Synchronized	X									RAM; Hard Drive Size; Processor Type; Processor Speed; Condition Type; Distribution Channel
OfficeMax	Brick & Mortar Retailer	Monitors	Transaction Prices	Synchronized	X	X			X					Condition Type; Distribution Channel.
PC Connection	Internet Retailer	Monitors	Transaction Prices	Weekly Average	X	X	X	X	X					Refurbished.
PC Connection	Internet Retailer	Televisions	Transaction Prices	Weekly Average	X	X	X			X				HD-ready.
PC Mall	Internet Retailer	Desktops	Transaction Prices	Weekly Average	X									RAM; Processor Speed; Retailer (PC Mall, Trend)
PC Mall	Internet Retailer	Monitors	Transaction Prices	Weekly Average	X	X		X	X					Refurbished; Retailer (PC Mall, Trend, SX)
PC Mall	Internet Retailer	Televisions	Transaction Prices	Weekly Average	X	X			X	X	X	X		Retailer (PC Mall, Trend)
Sam's Club (Retail Prices)	Brick & Mortar Retailer	Televisions	Weekly Average Prices	Weekly Average	X	X	X				X			
Sam's Club (Transaction Prices)	Brick & Mortar Retailer	Televisions	Transaction Prices	Weekly Average	X	X	X				X		Month	
Tatung	Product Manufacturer	Monitors	Transaction Prices	Monthly Average	X	X		X					Year	Color Display
Tech Data	Product Distributor	Monitors	Transaction Prices	Monthly Average	X	X		X	X					Speakers; Unbranded (generic).
Toshiba America Consumer Products (TACP)	Product Manufacturer	Televisions	Transaction Prices	Synchronized	X	X				X	X			
Toshiba America Electronics Corporation	Tube Distributor	CDTs	Transaction Prices	Synchronized	X									Model Number
Toshiba America Electronics Corporation	Tube Distributor	CPTs	Transaction Prices	Synchronized	X									Model Number
Toshiba America Information Systems	Product Manufacturer	Monitors	Monthly Average Prices	Monthly Average	X	X								Remanufactured; Obsolete; Discounted; Limited; Multimedia; Casing Color
Wal-Mart (Retail Prices)	Brick & Mortar Retailer	Televisions	Weekly Average Prices	Weekly Average	X	X	X			X	X			
Wal-Mart (Transaction Prices)	Brick & Mortar Retailer	Televisions	Transaction Prices	Weekly Average	X	X	X			X	X		Month	
Wal-Mart/Sanyo	Brick & Mortar Retailer	Televisions	List Prices	FOB Costs	X	X			X	X				Wide screen, Picture-in-picture.
Zones	Internet Retailer	Desktops	Transaction Prices	Synchronized	X									RAM; Processor Speed
Zones	Internet Retailer	Monitors	Transaction Prices	Synchronized	X	X	X	X	X					
Toshiba	Top-to-bottom	Televisions	Transaction Prices	Monthly Average	X	X			X		X			Picture-in-picture.
DisplaySearch	Top-and-bottom	Televisions	Monthly Average Prices	Monthly Average	X	X	X		X	X				

Note(s):
See Exhibit 34

Source File(s):
See Exhibit 36

Pass-Through Stata File List

Study Name	Stata Program Names
Amazon	Import Amazon Specs.do amazon_data_cleaning.do amazon_report.do
Arrow	arrow_data_cleaning.do arrow_report.do
BenQ	benq_customer_list.do benq_data_cleaning.do benq_report.do
Best Buy	bestbuy_data_load.do bestbuy_data_cleaning.do bestbuy_report.do
Buy.com	Import BuyCom Digests.do ReadSKUs.do buycom_data_cleaning.do buycom_report.do
CDW	cdw_data_cleaning.do cdw_report.do
Costco	costco_data_load.do costco_data_cleaning.do costco_report.do
Dell	dell_data_load.do dell_data_cleaning.do dell_report.do
Fry's	frys_data_cleaning.do frys_report.do
Funai	funai_data_cleaning.do funai_report.do
Gateway	gateway_data_cleaning.do gateway_report.do
Ingram Micro	ingram_micro_data_load.do ingram_micro_data_cleaning.do ingram_micro_report.do
OfficeMax	item_selection.do officemax_data_cleaning.do officemax_report.do
PC Connection	pcconnection_data_cleaning.do pcconnection_report.do
PC Mall	pcmall_data_cleaning.do pcmall_report.do
Wal-Mart/Sanyo	sanyo_data_cleaning.do sanyo_report.do
Toshiba America Consumer Products (TACP)	tacp_sales_load.do tacp_sales_clean.do tacp_report.do
Toshiba America Electronic Components (TAEC)	taec_data_load.do taec_report.do
Toshiba America Information Systems (TAIS)	tais_sales.do tais_report.do

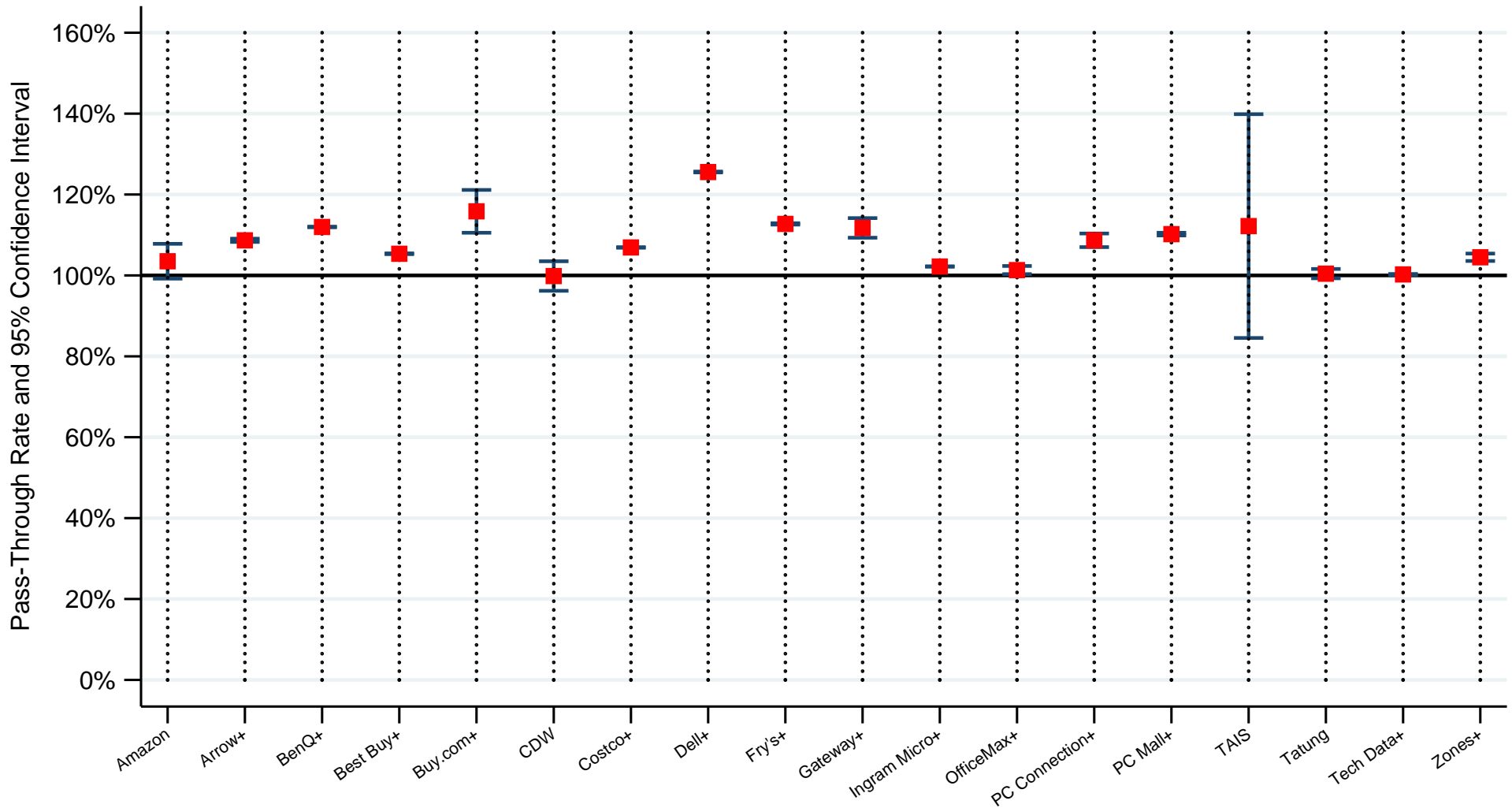
Tatung	tatung_costs.do tatung_sales.do tatung_report.do
Tech Data	techdata_data_cleaning.do techdata_report.do
Sam's Club (Retail Prices)	selected_stores.do selected_items.do additional_wm_sams_skus.do sams_retail_prices.do sams_retail_prices_report.do
Sam's Club (Transaction Prices)	selected_stores.do selected_items.do additional_wm_sams_skus.do sams_data_cleaning.do sams_report.do
Wal-Mart (Retail Prices)	selected_stores.do selected_items.do additional_wm_sams_skus.do walmart_retail_prices.do walmart_retail_prices_report.do
Wal-Mart (Transaction Prices)	selected_stores.do selected_items.do additional_wm_sams_skus.do walmart_data_cleaning.do walmart_report.do
Zones	zones_item_selection.do zones_data_cleaning.do zones_report.do
Top-to-Bottom: Toshiba	taec_data_load.do taccp_sales_load.do taccp_sales_clean.do costco_data_load.do costco_data_cleaning.do toshiba_top_to_bottom.do
Top-and-Bottom: DisplaySearch	all_defendants_price.do displaysearch_top_and_bottom_tvs.do displaysearch_top_and_bottom_tvs_report.do

Note(s):

Programs are listed in the order they should be run.

Monitor Pass-Through

Calculated Pass-Through Rates and 95% Confidence Intervals

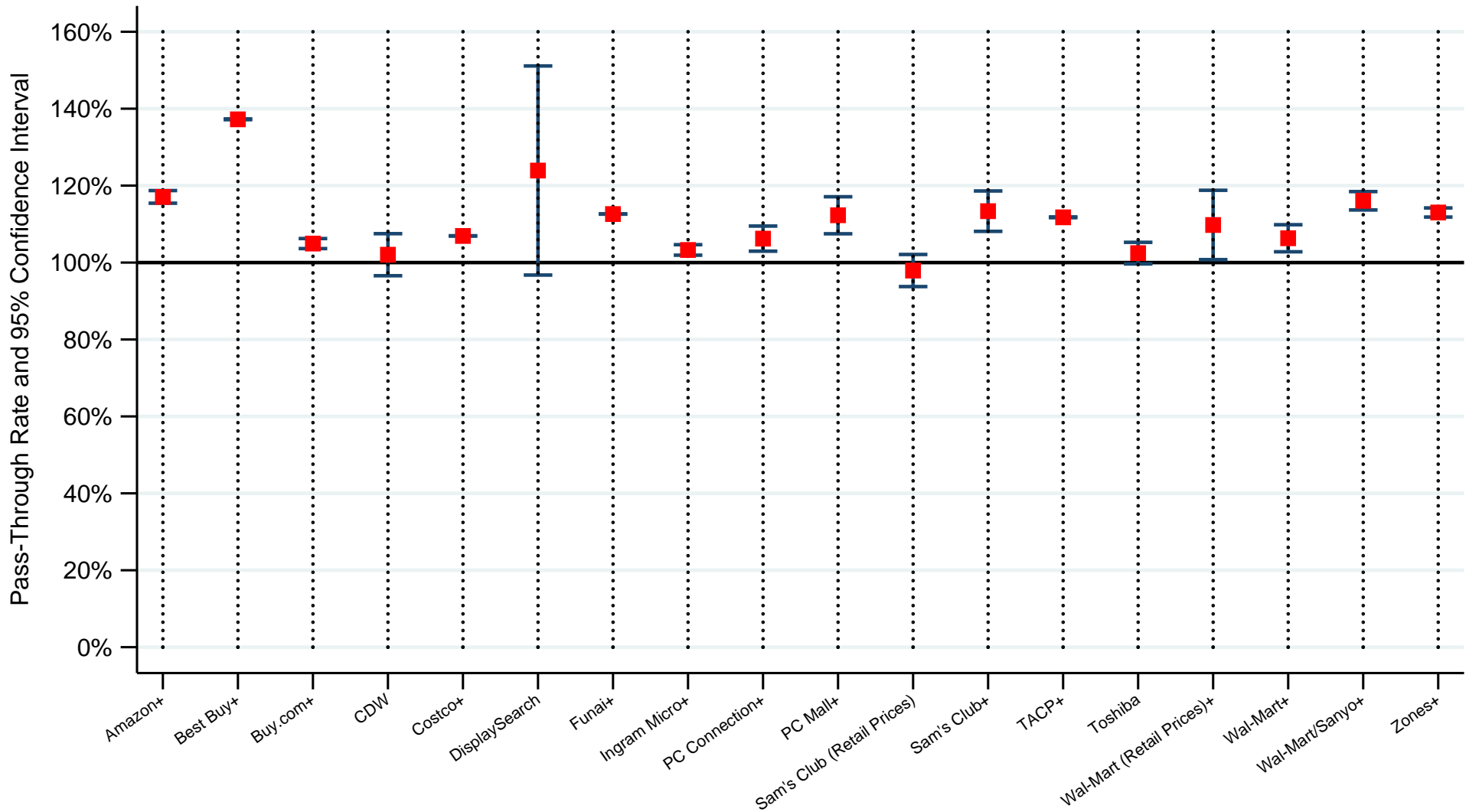


Econometric Study

Note: + The pass-through rate is statistically greater than 100%.
Source Files: See Exhibit 36.

Television Pass-Through

Calculated Pass-Through Rates and 95% Confidence Intervals

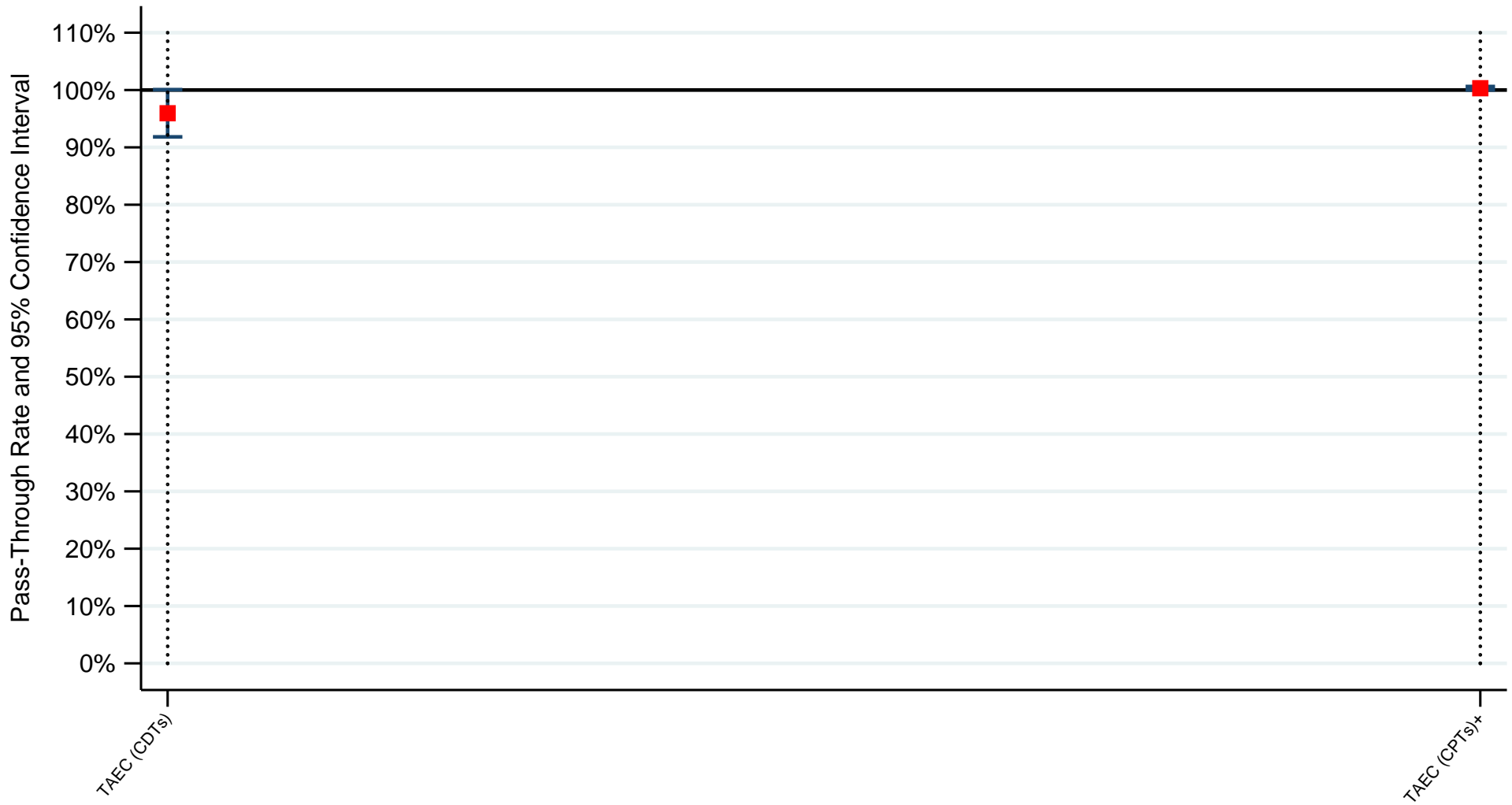


Econometric Study

Note: + The pass-through rate is statistically greater than 100%.
Source Files: See Exhibit 36.

Tubes Pass-Through

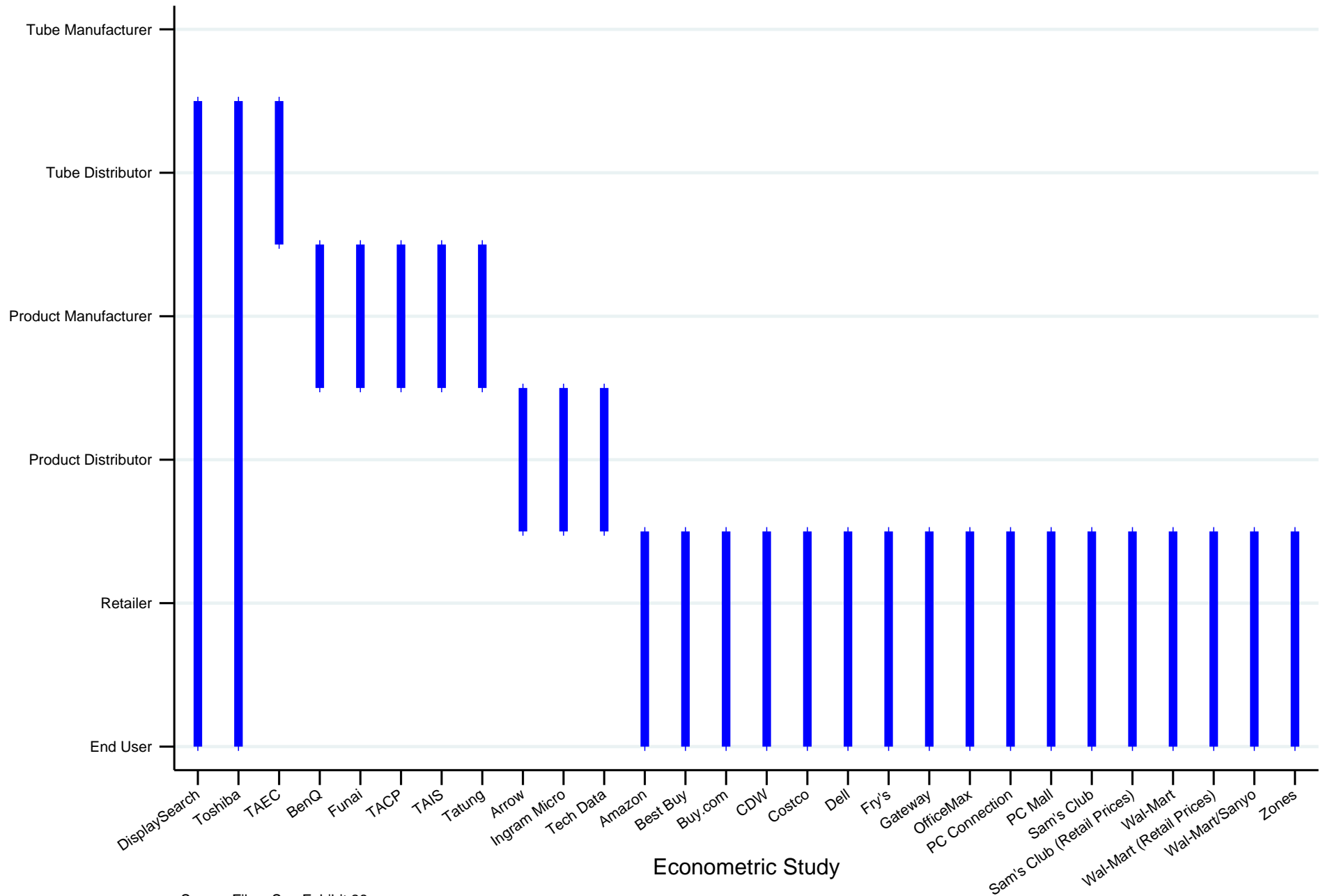
Calculated Pass-Through Rates and 95% Confidence Intervals



Econometric Study

Note: + The pass-through rate is statistically greater than 100%.
Source Files: See Exhibit 36.

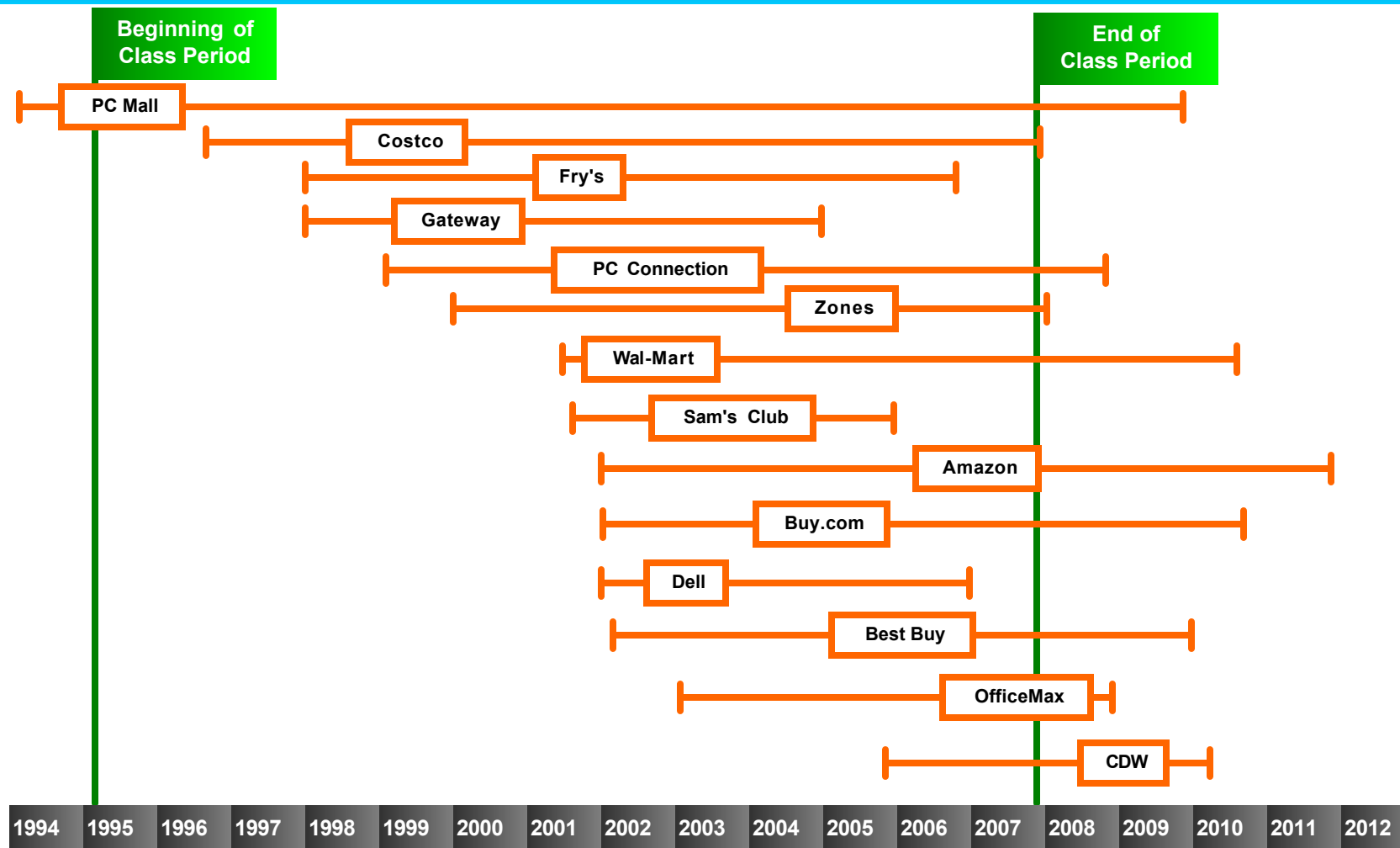
Pass-Through Studies Channel Coverage



Source Files: See Exhibit 36.

Econometric Study

Pass-Through Data by Year Retailers

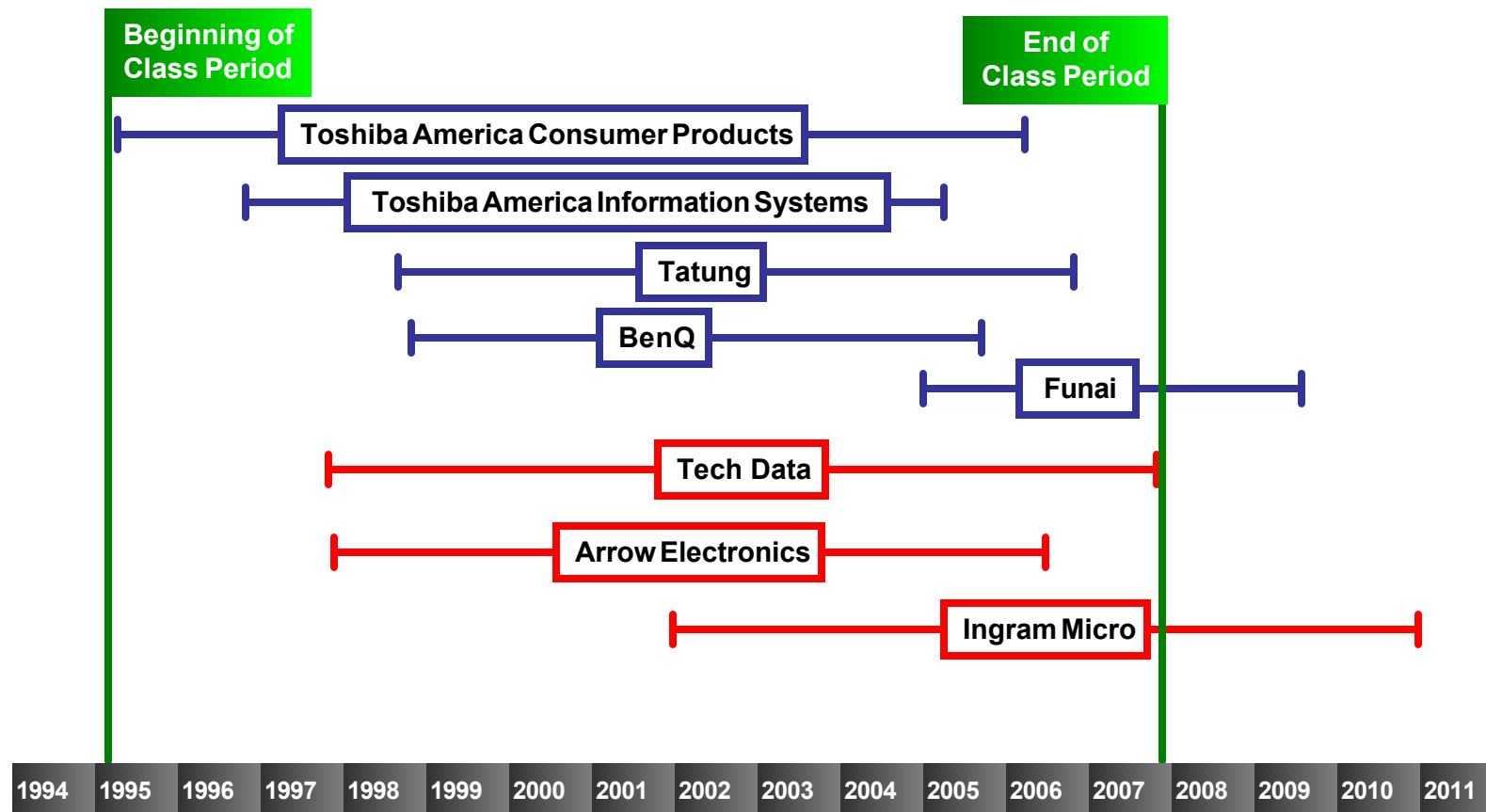


Source File(s):
See Exhibit 36.

Exhibit 41

Pass-Through Data by Year

Product Manufacturers and Product Distributors



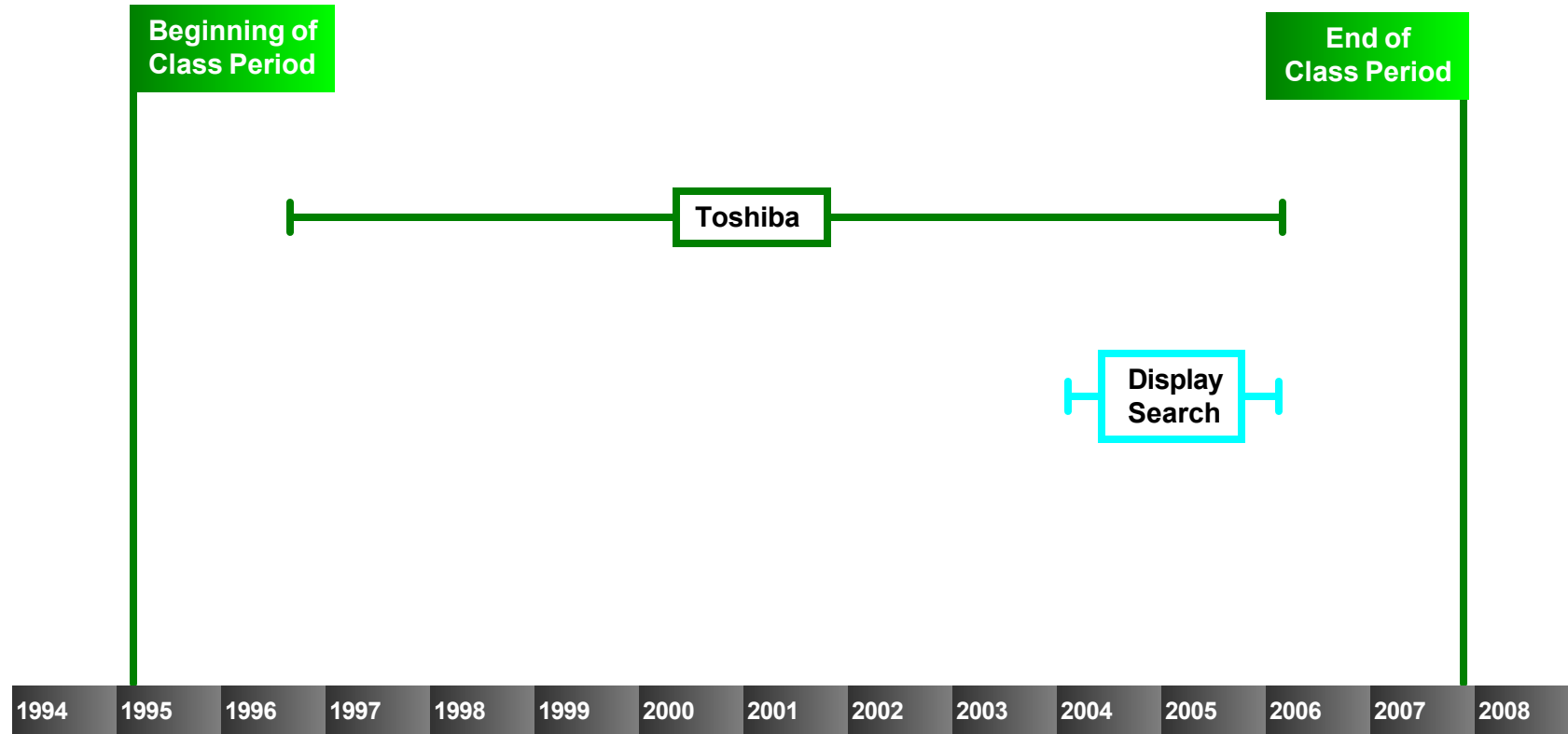
Note(s):

Blue indicates product manufacturers.
Red indicates product distributors.

Source File(s):

See Exhibit 36.

Pass-Through Data by Year Top-and-Bottom and Top-to-Bottom Studies



Note(s):

Blue indicates top-and-bottom studies.

Green indicates top-to-bottom studies.

Source File(s):

See Exhibit 36.

CRT Production and Market Shares Data Sources

	Dates Used	Tube Type Used	Subdivision	Granularity
Defendant Production				
Hitachi Displays, 2002, Untitled Spreadsheet, HDP-CRT00019322.	H1 1991 - H2 1999	CPT, CDT	Industry total quantities; Hitachi total quantities	By Half
MT Picture Display, November 2006, Untitled Spreadsheet, MTPD-0416090.	Q1 2000 - Q4 2006	CPT	Quantities by Manufacturer	By Quarter
Samsung, 11 December 2003, Worldwide CDT Manufacturer's Status, SDCRT-0201291.	Q1 1998 - Q4 2000	CDT	Quantities by Manufacturer	By Quarter
Undated, CDT maker sales, CHU00071226.	Q1 - Q4 2001	CDT	Quantities by Manufacturer	By Quarter
Third Party				
DisplaySearch, 2003, DisplaySearch Quarterly Desktop Monitor Shipment and Forecast Report Q1'03, CHWA00106460 - CHWA00106757.	Q1 - Q4 2002	CDT	By Manufacturer	By Quarter
DisplaySearch, 2003, Quarterly Desktop Monitor Shipment and Forecast Report, CHWA00062147 - CHWA00062569.	Q1 - Q4 2003	CDT	By Manufacturer	By Quarter
DisplaySearch, 07 July 2005, Q2'05 Quarterly Desktop Monitor Shipment and Forecast Report, CHWA00088192 - CHWA00088762.	Q2 2004 - Q1 2005	CDT	By Manufacturer	By Quarter
DisplaySearch, 30 September 2005, Q3'05 Quarterly Desktop Monitor Shipment and Forecast Report, CHU00281352 - CHU00281923.	Q2 2005	CDT	Shares by Manufacturer; quantities by size	By Quarter
DisplaySearch, 30 March 2007, Q1'07 Quarterly Desktop Monitor Shipment and Forecast Report, CHU00154037 - CHU00154420.	Q3 2005 - Q4 2006	CDT	Shares by Manufacturer; quantities by size	By Quarter
DisplaySearch, 28 September 2007, Q3'07 Quarterly Desktop Monitor Shipment and Forecast Report, LGE00076321 - LGE00076707.	Q1 - Q2 2007	CDT	Shares by Manufacturer; quantities by size	By Quarter

General Data Sources

	Source Files
Daily Exchange Rates Japanese Yen to U.S. Dollar: Board of Governors of the Federal Reserve System, 30 March 2012, Daily Japan / U.S. Foreign Exchange Rate 1971-01-04 to 2012-03-02, http://research.stlouisfed.org/fred2/series/DEXJPUS?cid=94 , accessed 09 March 2012. JPY to USD Exchange Rates to 20120302.txt	exchange_rates_load_daily.do
South Korean Won to U.S. Dollar: Board of Governors of the Federal Reserve System, 02 March 2012, Daily South Korea / U.S. Foreign Exchange Rate 1981-04-13 to 2012-03-02, http://research.stlouisfed.org/fred2/series/DEXKOUS?cid=94 , accessed 09 March 2012. KRW to USD Exchange Rates to 20120302.txt	exchange_rates_load_daily.do
Malaysian Ringgit to U.S. Dollar: Board of Governors of the Federal Reserve System, 02 March 2012, Daily Malaysia / U.S. Foreign Exchange Rate 1971-01-04 to 2012-03-02, http://research.stlouisfed.org/fred2/series/DEXMAUS?cid=94 , accessed 09 March 2012. MYR to USD Exchange Rates to 20120302.txt	exchange_rates_load_daily.do
Chinese Yuan to U.S. Dollar: Board of Governors of the Federal Reserve System, 02 March 2012, Daily China / U.S. Foreign Exchange Rate 1981-01-02 to 2012-03-02, http://research.stlouisfed.org/fred2/series/DEXCHUS?cid=94 , accessed 09 March 2012. RMB to USD Exchange Rates to 20120302.txt	exchange_rates_load_daily.do
Thai Baht to U.S. Dollar: Board of Governors of the Federal Reserve System, 10 April 2012, Daily Thailand / U.S. Foreign Exchange Rate 1981-01-02 to 2012-04-06, http://research.stlouisfed.org/fred2/series/DEXTHUS?cid=94 , accessed 10 April 2012. THB to USD Exchange Rates to 20120302.txt	exchange_rates_load_daily.do
New Taiwan Dollars to U.S. Dollar: Board of Governors of the Federal Reserve System, 02 March 2012, Daily Taiwan / U.S. Foreign Exchange Rate 1983-10-03 to 2012-03-02, http://research.stlouisfed.org/fred2/series/DEXTAUS?cid=94 , accessed 09 March 2012. TWD to USD Exchange Rates to 20120302.txt	exchange_rates_load_daily.do
U.S. Dollars to Euro: Board of Governors of the Federal Reserve System, 17 April 2012, Daily U.S. / Euro Foreign Exchange Rate 1999-01-04 to 2012-04-13, http://research.stlouisfed.org/fred2/series/DEXUSUK?cid=94 , accessed 17 April 2012. USD to EUR Exchange Rates to 20120413.txt	exchange_rates_load_daily.do
Monthly Exchange Rates Brazilian Reals to U.S. Dollar: Board of Governors of the Federal Reserve System, 28 March 2012, Monthly Average Brazil / U.S. Foreign Exchange Rate 1995-01-02 to 2012-03-23, http://research.stlouisfed.org/fred2/series/DEXBZUS/downloaddata?cid=94 , accessed 28 March 2012. Monthly Average BZU to USD Exchange Rates.txt	exchange_rates_load_monthly.do
German Deutsche Marks to U.S. Dollar: Board of Governors of the Federal Reserve System, 28 March 2012, Monthly Average Germany / U.S. Foreign Exchange Rate (DISCONTINUED SERIES) 1971-01-01 to 2001-12-01, http://research.stlouisfed.org/fred2/series/EXGEUS?cid=277 , accessed 28 March 2012. Monthly Average DEM to USD Exchange Rates.txt	exchange_rates_load_monthly.do
Japanese Yen to U.S. Dollar: Board of Governors of the Federal Reserve System, 01 March 2012, Monthly Average Japan / U.S. Foreign Exchange Rate 1971-01-01 to 2012-02-01, http://research.stlouisfed.org/fred2/series/DEXJPUS?cid=94 , accessed 30 March 2012. Monthly Average JPY to USD Exchange Rates.txt	exchange_rates_load_monthly.do
South Korean Won to U.S. Dollar: Board of Governors of the Federal Reserve System, 02 March 2012, Monthly Average South Korea / U.S. Foreign Exchange Rate 1981-04-13 to 2012-03-02, http://research.stlouisfed.org/fred2/series/DEXKOUS?cid=94 , accessed 09 March 2012. Monthly Average KRW to USD Exchange Rates.txt	exchange_rates_load_monthly.do

Malaysian Ringgit to U.S. Dollar:	
Board of Governors of the Federal Reserve System, 02 March 2012, Monthly Average Malaysia / U.S. Foreign Exchange Rate 1971-01-04 to 2012-03-02, http://research.stlouisfed.org/fred2/series/DEXMAUS?cid=94 , accessed 09 March 2012. Monthly Average MYR to USD Exchange Rates.txt	exchange_rates_load_monthly.do
Chinese Yuan to U.S. Dollar:	
Board of Governors of the Federal Reserve System, 02 March 2012, Monthly Average China / U.S. Foreign Exchange Rate 1981-01-02 to 2012-03-02, http://research.stlouisfed.org/fred2/series/DEXCHUS?cid=94 , accessed 09 March 2012. Monthly Average RMB to USD Exchange Rates	exchange_rates_load_monthly.do
Thai Baht to U.S. Dollar:	
Board of Governors of the Federal Reserve System, 10 April 2012, Monthly Average Thailand / U.S. Foreign Exchange Rate 1981-01-02 to 2012-04-06, http://research.stlouisfed.org/fred2/series/DEXTHUS?cid=94 , accessed 10 April 2012. Monthly Average THB to USD Exchange Rates.txt	exchange_rates_load_monthly.do
U.S. Dollars to Euro:	
Board of Governors of the Federal Reserve System, 28 March 2012, Monthly Average U.S. / Euro Foreign Exchange Rate 1999-01-01 to 2012-02-01, http://research.stlouisfed.org/fred2/series/DEXUSUK?cid=94 , accessed 28 March 2012. Monthly Average USD to EUR Exchange Rates.txt	exchange_rates_load_monthly.do
Semiannual Exchange Rates	
Japanese Yen to U.S. Dollar:	
Board of Governors of the Federal Reserve System, 24 April 2012, Semiannual Japan / U.S. Foreign Exchange Rate 1971-01-04 to 2012-04-20, http://research.stlouisfed.org/fred2/series/DEXJPUS?cid=94 , accessed 24 April 2012. Semiannual Average JPY to USD Exchange Rates.txt	exchange_rates_load_semiannual.do

EXHIBIT 35

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

IN RE: CATHODE RAY TUBE (CRT)
ANTITRUST LITIGATION

Master File No. CV-07-5944-SC
MDL No. 1917

EXPERT REPORT OF ROBERT D. WILLIG

12/17/12

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I. Introduction

A. Qualifications

1. I am a Professor of Economics and Public Affairs at the Woodrow Wilson School and the Economics Department of Princeton University, USA. I am also a Senior Consultant at Compass Lexecon, an economics consulting firm based in the U.S. Previously, I was a Supervisor in the Economics Research Department of Bell Laboratories. My teaching and research have specialized in the fields of industrial organization, government-business relations, and welfare theory.

2. I have extensive experience analyzing economic issues arising under the law. From 1989 to 1991, I served as Chief Economist in the Antitrust Division of the U.S. Department of Justice, where I led the development of the 1992 *Horizontal Merger Guidelines*. I met with outsiders, weighed evidence, and participated in decisions on when to use enforcement power. Core to my work were issues pertaining to alleged conspiracies and market competition. I am the author of *Welfare Analysis of Policies Affecting Prices and Products* and *Contestable Markets and the Theory of Industry Structure* (with William Baumol and John Panzar) as well as numerous articles. I have served on the editorial boards of *The American Economic Review*, *The Journal of Industrial Economics*, and the *MIT Press Series on Regulation*. Also, I have served as a consultant and advisor to the Federal Trade Commission, the Department of Justice, the OECD, the Inter-American Development Bank, the World Bank, and the governments of many nations.

3. I was invited by the Pennsylvania Bar Institute, Antitrust Law Committee CLE and the PLI Annual Antitrust Law Institute in 2007 to give talks on class certification matters, and I have prepared expert reports on class certification matters.

4. My curriculum vitae, which includes a list of my publications, is at Attachment 1. A list of matters in which I have given sworn testimony as an expert during the past four years, at trial or in deposition, is at Attachment 2.

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B. Assignment

5. The allegations in this case involve a conspiracy to elevate the prices of cathode ray tubes (“CRTs”). Plaintiffs allege that Defendants successfully colluded to elevate the prices of CRTs sold in the U.S. between March 1995 and November 2007 (the class period).¹ Plaintiffs have asked the Court to certify a class of indirect purchasers (“IPP class”) comprised of “[a]ll persons and or entities who or which indirectly purchased [CRTs] in the United States for their own use and not for resale [during the class period]...”²

6. I understand that it is incumbent on Plaintiffs to show that injury and damages to the IPP class as a result of the alleged cartel of CRT manufacturers during the class period can be established using common evidence and common methods, i.e., that the conduct at issue had a “common impact” on members of the proposed class of indirect purchasers.

7. I have been retained by a subset of the Defendants³ to:

- a) Address whether Plaintiffs are likely to be able to demonstrate, at a single trial, through common proof on a class-wide basis, that all or virtually all of the members of the proposed class suffered economic injury from the alleged conspiracy;
- b) Review the expert report filed by Dr. Janet Netz, the economic expert for the IPP class, and opine on the analyses and views presented therein.

8. As a starting point for my analysis, I assume that the IPP class is correct in its allegation that the group of defendant CRT manufacturers conspired to elevate prices of

¹ Named Defendants are: Chunghwa, Daewoo/Orion, Hitachi, IRICO, Philips, LG, LG.Philips Displays (“LPD”) (an independent joint venture that combined LG's and Philips' CRT manufacturing businesses), SDI, SEAI, SEC, Samtel, Thai CRT and MTPD (a new entity formed by Panasonic and Toshiba with these two entities being named as separate defendants prior to the formation of MTPD in 2003). (Indirect Purchaser Plaintiffs’ Consolidated Amended Complaint, 16 March 2009, pp.1, 9-29.) I understand that Plaintiffs’ seek to add six additional defendants (two Thomson entities, three Mitsubishi entities, and Videocon). (Declaration of Janet S. Netz, Ph.D., in Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification (hereafter “Netz Report”), p. 3.)

² Indirect Purchaser Plaintiffs’ Consolidated Amended Complaint, March 16, 2009, p.55.

³ I have been retained by LG, SDI, SEA, SEC, Philips, Hitachi, Toshiba, Panasonic, and MTPD.

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some CRTs to direct purchasers during the relevant period. However, I do not assume that the alleged cartel was effective in its attempts to elevate prices to any or all direct purchasers of CRTs during the twelve-year class period. I also do not assume that any elevations in prices of CRTs to direct purchasers during the class period by the alleged cartel were passed along to indirect purchasers. Instead, I investigate whether, as an empirical matter, the impact – if any – on all indirect purchasers can be assessed using common evidence and methods.

9. A list of the information and data I relied upon in forming the opinions expressed herein is attached at Attachment 3. My opinions expressed herein are based on those materials and data, my knowledge and experience in industrial organization economics and antitrust economics, my experience in antitrust enforcement at the Department of Justice, and my experience in advising and consulting with clients on competition matters over the past 30 years, both here and abroad.

10. The opinions expressed in this report reflect the information and facts I believe to be true at the time this report is filed. I reserve the right to revise my opinions if additional information and facts supplied in discovery or through subsequent expert reports and depositions make such revisions appropriate.

11. Compass Lexecon is being compensated for my work at my usual hourly rate of \$1300, which is the same rate for research and testimony. This compensation is in no way connected to the outcome of this litigation.

II. Summary of Conclusions

12. Given the complexities of the CRT marketplace during the class period, my overall conclusion is that common methods and evidence cannot be used to assess the impact of the alleged cartel on members of the proposed IPP class, and instead an individualized examination is required to determine whether any particular direct or indirect purchaser actually paid a cartel overcharge when purchasing a given CRT or CRT finished product. I also conclude that the methods of common proof proposed by Plaintiffs' economist Dr. Netz are unreliable as a matter of economics and cannot in this case substitute for

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individualized inquiries. I briefly summarize my more detailed conclusions below, and provide my analyses in the body of this report.

A. Widespread Impact on Direct Purchasers Cannot Be Established using Common Evidence

13. Dr. Netz claims that common methods and evidence can be used to establish that the alleged CRT price-fixing conspiracy impacted all or nearly all the members of the proposed IPP class. With regard to overcharges paid by direct purchasers, this assertion rests on two claims. The first is Dr. Netz's claim that prices of CRTs exhibited a "price structure" which in her view implies that "prices for CRTs with different product configurations and sold to different customers would respond in similar ways to a price-fixing conspiracy."⁴ (The concept of such a "price structure" is not generally recognized in the economic literature. See discussion in footnote 4.) The second claim is Dr. Netz's contention that the Defendants were successful in setting sales prices to match "target prices" established by the alleged cartel, and that the alleged cartel successfully elevated the prices for *all* CRTs sold during the twelve-year proposed class period. Both of these contentions are untenable in light of economic analysis of the relevant evidence.

⁴ Netz Report, p. 5. Dr. Netz offers various vague definitions for the term "price structure." At different points in her report, she states that a price structure means that "prices are related by market forces" (*Id.*); "A price structure describes relative prices" (*Id.*, p. 65); and "I call the relationships between prices for CRTs the price structure." (*Id.*) If by "price structure," Dr. Netz means only that there is some relationship among CRT prices or that one can calculate the relative prices between two CRT products, then the existence of a price structure for CRTs clearly would not be sufficient to demonstrate that "prices for CRTs with different product configurations and sold to different customers would respond in similar ways to a price-fixing conspiracy." (Netz Report, p. 5) More generally, the notion of such a "price structure" is not a standard concept found in the economics literature, and the establishment of a "price structure," however defined, as evidence that a class should be certified is not an approach generally accepted by economists. (Johnson, J. H., & Leonard, G. K. (2008). In the Eye of the Beholder: Price Structure as Junk Science in Antitrust Class Certification Proceedings. *Antitrust*, volume 22 (no 3). pp. 108-112.) Nevertheless, for the purposes of my analysis, I assume that Dr. Netz uses the term "price structure" to mean that she believes there is some sort of inherent relationship among prices for different CRTs that would imply that "prices for CRTs with different product configurations and sold to different customers would respond in similar ways to a price-fixing conspiracy." (Netz Report, p. 5)

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Actual Pricing Data Are Wholly Inconsistent with the Existence of a Structure in Prices of CRTs and CRT Finished Products.

14. Dr. Netz's Alleged Price Structure Is Inconsistent with the Widespread CRT Price Dispersion Observed in the Data.

Dr. Netz's "price structure" theory is inconsistent with the heterogeneity and diversity observed in the CRT pricing data during the class period. Specifically, an examination of the underlying price data shows that prices of CRTs did not move together. Instead, prices of CRTs moved disparately, with some prices increasing, others decreasing, and the rest remaining relatively constant. The same is also true of the prices of CRT finished products.

15. CRT Price Disparity Is Attributable to Various CRT Product Features and the Various Geographic Regions in which CRTs Were Manufactured and Sold.

CRTs' prices show such disparity because CRTs are widely differentiated by features such as application (TVs or computer monitors), brand, size, shape, resolution, the inclusion or exclusion of deflection yokes,⁵ type of mask, electrical properties, and the extent and type of customization. CRT prices can also depend on the region in which a CRT is manufactured and the region in which it is sold. Exhibit 1A illustrates the substantial amount of dispersion in CRT prices that existed at any given point in time during the class period. Taking August 2001 as an illustrative example, 10% of CRT prices that month were below \$38 and 10% were \$195 or more (more than 5x higher). As explained in detail in Section III.A below, I observe substantial price variation of this kind in other months as well.

⁵ "Deflection yoke" and other industry terms are explained later in the report.

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16. Various Market Forces, Such as Competition from LCD and Plasma Technologies, Impacted Different CRT Prices Differently at Various Points during the Proposed Class Period.

Substantially different market forces influenced the prices of different CRT segments at various points during the class period. From 2000 onward, fierce competition from LCD and plasma display technologies rapidly shrank the CRT share of the display marketplace. This development affected color display tubes (“CDTs”), which are used in computer monitors, earlier and more strongly than color picture tubes (“CPTs”), which are used in TVs. Thus, CRT global desktop monitor penetration declined from 91% in early 2001 to just 10% by late 2007, in contrast to the market share for CRT televisions globally, which only declined from nearly 100% in 2001 to 48% by late 2007. (See Exhibit 4A.) The growth in sales of LCD and plasma screens also affected some types of CPTs (large and flat screen CPTs) more than others.

17. Different CRT Models Experienced Significantly Different Price Movements over Time Due to the Various Powerful Market Forces

The differential impacts of various market forces on different segments of the CRT marketplace are reflected in the substantial heterogeneity in pricing movements across CRTs. For example:

- a) In nearly every month during the class period, the month-over-month price changes of CRT products ranged from increases of more than 5% to decreases of more than 5%. (See Exhibit 2A.)
- b) In roughly half the months during the class period, at least 20% of CRT prices declined (month-over-month) by 2% or more while at least 20% of CRT prices increased or remained unchanged during the same period.⁶
- c) For every CRT category, in those months during the class period in which its average prices changed the most, at least 35% of the prices in every other

⁶ Two percent is a material change for a single month. For context, note that average CPT and CDT prices, respectively, declined by 0.6% and 1% per month during the class period, which was enough to produce a cumulative decline of nearly 60% and 80% in average CPT and CDT prices, respectively, over the course of the class period. (Here, changes in “average” CPT and CDT prices refer to changes in the Fisher Price Indices of each, as illustrated in Exhibit 6.)

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CRT category changed in the opposite direction or did not change. (See Exhibit 3A.)

- d) For every CRT category, in those months during the class period in which its average prices changed the most, a large fraction of prices in that CRT category changed in the opposite direction or did not change. (*Id.*)

18. There Is Substantial Evidence of Differing CRT Price Movements across Geographic Regions.

In addition to the differentiated CRT price dynamics across and within product categories, there is substantial evidence of diverse CRT price dynamics across geographic regions. Marketplace conditions were different for CPTs sold in North America than for CPTs sold in other parts of the world. LCD and plasma technologies penetrated the U.S. marketplace earlier and faster than many other parts of the world. Greater competition from LCDs in the U.S. would likely have reduced the impact of the putative cartel in the U.S. relative to the rest of the world. Given these facts, it would not be surprising if prices for CPTs sold in the U.S./North America moved differently from prices for CPTs sold in other parts of the world. Indeed, CPT sales data produced by the Defendants show that prices of CPTs sold in North America had substantially different patterns of changes than prices of CPTs sold in the rest of the world. (See Exhibit 9.)

19. CRT Finished Products Varied in Price.

CRT finished products such as TVs, monitors, and desktop PC/monitor bundles also varied substantially in their price levels and price changes. The dispersion in price levels can be illustrated using prices reported by named IPP class members. For example, Plaintiff Steve Ganz purchased a 27" Toshiba CRT TV from Best Buy in May 2005 for \$329.99. In the same month, Best Buy sold 27" Toshiba CRT TVs at prices ranging from \$25 to \$719.99. About 34% of the 27" Toshiba televisions Best Buy sold in May 2005 were priced below \$250 and 17% were priced above \$400.⁷

⁷ The variation in price was likely due to factors such as whether or not a TV was sold in combination with a VCR.

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20. Prices of CRT Finished Products Exhibited Highly Differentiated Price Dynamics.

- a) Month-to-month changes in retail prices of individual TVs and monitors varied greatly across retailers. At Costco, for example, price changes rarely exceeded 1% in either direction. In contrast, in virtually every month, some retail CRT TV or monitor prices at Best Buy increased by more than 30% while others decreased by more than 30%. (See Exhibit 2B.)
- b) In a large majority of months in the class period, at least 20% of retail CRT finished product prices declined (month-over-month) by 5% or more, while at least 20% of TV and monitor prices were increasing.⁸
- c) For each category of finished CRT products, in those months during the class period in which its average prices changed the most, at least 25% of the prices in each of the other CRT finished product categories changed in the opposite direction. (See Exhibit 3B.)

The Observed Variation in CRT Price Movements Precludes the Use of a Price Structure Theory as the Basis for Establishing Antitrust Impact to All Direct and Indirect Purchasers.

21. Common Evidence Cannot Be Used to Establish that the Alleged Collusion Affected All Prices When Some Prices Increased While Others Decreased.

This kind of variation in price movements makes it implausible that antitrust impact to all direct and indirect purchasers in the U.S. could be proven on the basis of a “price structure” theory. For example, between September 2003 and October 2003, 24% of retail CRT finished product prices declined by at least 5%, while about 44% of retail finished product prices increased during the same month. Suppose, hypothetically, that evidence indicated that the alleged collusion affected the pricing of those CRT finished products whose prices remained the same or increased from September 2003 to October 2003. There is no sound economic basis to assume that this same hypothesized evidence could show that the alleged collusion affected the prices of CRT finished products whose prices declined by 5% or more during this same period.

⁸ This finding is based on the thirteen retailers whose sales data are identified in the notes for Exhibit 3B.

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22. Market Forces Unrelated to the Alleged Collusion Likely Affected the Pricing of CRTs whose Prices Declined.

Significantly different market forces other than the hypothesized collusion must have affected the pricing of those CRTs and finished products whose prices declined during this period. None of the analyses in Dr. Netz's report demonstrate that proof that the alleged cartel impacted prices of CRT finished products whose prices increased from September 2003 to October 2003 can somehow also serve as common proof of antitrust impact with regard to CRT finished products whose prices actually *declined* during the same period. Rather, when, as here, prices of some CRTs and CRT-based products increased, some decreased, and some stayed the same over the course of the same time period, individualized inquiries and individualized evidence would be necessary to assess whether the observed prices were higher than they would have been absent the alleged collusion.⁹ In particular, evidence specific to the products that experienced price declines would have to be assembled to show that their prices would have declined by even more absent the alleged collusion. Thus, individualized inquiries rather than common evidence would be needed to show class-wide impact of the alleged collusion.

23. Dr. Netz's Hedonic Regression Models and Their "Results" Do Not Support the Existence of a Price Structure.

Although Dr. Netz asserts that her hedonic regression analysis supports her claim that CRT prices exhibited a "structure," her hedonic regressions rely, improperly for this purpose, on the average relationships across categories of CRT products, thereby masking the differences in pricing patterns among different types of CRTs. As a result, her regressions do not demonstrate that CRT prices exhibited a "structure." On the

⁹ See ABA Section of Antitrust Law. (2005). *Econometrics: Legal, Practical, and Technical Issues*. pp. 209-11. ("[W]hen the prices for some customers are going up while the prices of other customers are not, there is reason to doubt that the different customers (class members) are experiencing a common impact."); Godek, P. E., & Ordovery, J. A. (2009). Economic Analysis in Antitrust Class Certification: Hydrogen Peroxide. *Antitrust, Fall 2009*. p. 64 (It "is not plausible to assert that one customer was harmed by a price increase while another was harmed by a price decrease over the same period.").

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contrary, in Section III.A below, I demonstrate that a properly constructed hedonic regression shows that CRT prices exhibit no such “structure,” a finding that is consistent with a simple examination of the variation in CRT price changes at any given point in time during the class period. As a result, Dr. Netz presents no reliable evidence that “prices for CRTs with different product configurations and sold to different customers would respond in similar ways to a price-fixing conspiracy.”¹⁰

There Is No Evidence of Sustained and Effective Collusion across All CRTs Ultimately Purchased by the Proposed Class.

24. Dr. Netz contends that the Defendants were successful in setting prices to match “target prices” allegedly established by Defendants, and that this implies that the alleged cartel successfully elevated the prices for *all* CRTs sold during the twelve-year proposed class period.

25. Economic Theory Predicts that Cartels in Industries with Features Similar to those of the CRT Industry May Potentially Not Be Effective at Generally Raising Prices.

Economic theory has established that cartels in industries with certain features and conduct are less likely to be effective than cartels in industries without those features. Such characteristics include: opaque pricing (i.e., suppliers’ prices are not entirely transparent to competitors) and differing degrees of vertical integration among Defendants. These features were found in the CRT industry during the relevant period.

26. The Documentary Evidence on which Dr. Netz Relies to Establish the Alleged Cartel’s Success Actually Indicates that the Cartel Was Not Uniformly Successful.

The evidence strongly indicates that the alleged cartel was not uniformly effective in elevating prices. For example, many of the documents cited by Dr. Netz as evidence of Defendants meeting in order to set “target prices” refer to members of the putative cartel undercutting prices of other Defendants. Changes in Defendants’ market shares are consistent with these documents.

¹⁰ Netz Report, p. 5.

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27. The Lack of Correlation between Changes in the Alleged Target Prices and Actual Sales Prices Is Additional Evidence of the Cartel's Failure to Raise Prices across All CRTs Ultimately Purchased by the Proposed Class.

The documentary evidence of breakdowns in the alleged cartel is supported by data on actual CRT prices. In particular, as Dr. Netz acknowledges, if Defendants adhered to the alleged target prices when setting their actual sales prices, changes in the Defendants' actual sales prices would have closely followed changes in the alleged target prices. I find that changes in actual CRT prices generally did not correspond to changes in the putative target prices, which demonstrates that Defendants did not set actual CRT prices in a common manner that was consistent with target cartel prices identified by Dr. Netz.

28. Dr. Netz's Inclusion of Premium Models in Her Actual Price Data, When Target Prices Were Generally for Basic Models, Biases Her Results in Favor of Finding that Actual Prices Were "Approximately Equal" to Target Prices, as She Herself Acknowledges.

Dr. Netz does not compare *changes* in actual and target prices, but she does compare their *levels*, and she concludes that "prices paid by [direct purchasers] were approximately equal to the cartel's target prices."¹¹ It is impossible validly to justify this conclusion based on her analysis. As she herself acknowledges, her analysis is biased because she compares actual prices for both basic and premium CRTs with target prices that "are generally for basic models."¹² As a result, her test could mistakenly indicate that sales prices were at or above target prices regardless of whether manufacturers in fact set actual prices below target prices.

¹¹ Netz Report, p.33.

¹² Netz Report, p.63

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29. Dr. Netz's Own Data Analysis Shows that Defendants Charged Prices Below the Alleged Target Prices a Majority of the Time.

Moreover, even ignoring the inherent bias in Dr. Netz's target price analysis, Dr. Netz's own data show that the Defendants more often than not charged prices *below* the alleged target prices, often by a substantial amount. Even if one accepts for the sake of argument Dr. Netz's assertion that all of the alleged "target prices" were above the "but for" (i.e., competitive) levels for the CRTs at issue, because Dr. Netz does not identify any but-for prices, her analysis cannot establish that prices that were below the corresponding alleged target price were above the but-for price. Thus, Dr. Netz's target price analysis cannot validly constitute even part of a common demonstration of impact across the IPP class.

B. Class-Wide Impact on Indirect Purchasers Cannot Be Established using Common Evidence

30. Dr. Netz contends that manufacturers and re-sellers passed through the elevated costs of CRTs and CRT finished products in a uniform and common manner, always passing through at least 100% of the elevated cost of CRTs to end-users.¹³

31. CRT Industry Characteristics Make Uniform Pass-Through Highly Unlikely.

Industry characteristics suggest such uniform pass-through is highly unlikely. As an initial matter, there is no dispute in this case that the proposed IPP class bought thousands of highly differentiated models of CRT televisions and computer monitors, with components that included thousands of different CRTs, from hundreds of different retailers, during a period of more than twelve years. Data produced by re-sellers in the instant matter indicate that re-sellers often charged different prices to different customers for the same product based on the store, date of sale, region, and promotions in place.

¹³ Netz Report, p. 104.

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32. Finished Product Price Levels and Price Changes Varied Greatly across Retailers, Products, and Time Due to (1) the Complex and Lengthy CRT Distribution Chains and (2) Various Strong Market Forces that Impacted CRT Models Differently.

Not only were the price *levels* of CRT finished products differentiated across retailers, products and time, *changes* in prices of CRT finished products were also highly differentiated. In any given time period, the prices of most finished CRT products, like the prices of CRTs themselves, changed substantially and very differently over the twelve-year class period (although generally trending down). Different CRT products were affected by different market forces and were affected by the same market forces differently. Compounding the elements of heterogeneous dynamics, distribution chains for CRTs were diverse and could be long and complex. Many CRTs were sold up to five times (including when embedded in a finished product) before reaching the end user. The distribution chains included various types of re-sellers (bricks-and-mortar retailers, internet retailers, commercial distributors, etc.) with varying business models.

33. Dr. Netz Ignores Relevant Industry Characteristics and Uses a Flawed Regression Model to Conclude Invalidly that Average Pass-Through Rates Were Uniformly Greater than 100%.

Despite these industry features, Dr. Netz concludes, based on a regression analysis of prices and costs, that average pass-through rates were uniformly 100% or higher among the varied intermediaries in the CRT distribution chains that she examined. There are several substantial flaws in Dr. Netz's regression model, and correcting (or mitigating) these flaws leads to a very different conclusion: that average pass-through rates were often below the rates estimated by Dr. Netz and varied substantially across re-sellers and manufacturers.

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34. Additionally, Dr. Netz’s Regression Model Is Misleadingly Inapposite for Analysis of the Validity of the Proposed Class Because It Estimates an Average Pass-Through Rate for Each Firm, Rather than the Pass-Through Rates for Particular Transactions, Thus Ignoring the Substantial Variations in Pass-Through Rates across Different Products, Time Periods, and Customers.

Even setting aside the flaws in her regression model, Dr. Netz’s pass-through analysis is not on-point for analysis of the validity of the proposed class because it generates estimates of only the *average* pass-through rate (across all products, time periods, and customers) for each finished product manufacturer or reseller in the distribution chain. Dr. Netz’s analysis provides no information about the pass-through rate for particular transactions or for the transactions that lead up to a sale to an end-user. This is a critical shortcoming of her analysis because the data reveal that pass-through rates varied widely by manufacturer or re-seller, product, and time period, among other factors. In particular, pass-through rates were often well below the average pass-through rates estimated by Dr. Netz, and in a significant number of cases re-sellers did not pass-through cost changes at all. As a result, estimates of the average pass-through rate provide no indication of whether the alleged overcharge on a particular product was passed-through to a particular customer, and thus do not constitute a reliable methodology for demonstrating that the alleged conspiracy had class-wide impact.

III. Widespread Impact on Direct Purchasers Cannot Be Established using Common Evidence

35. Dr. Netz claims that common methods and evidence can be used to establish that the alleged conspiracy impacted all or nearly all the members of the proposed class.¹⁴ This assertion rests in turn on two basic claimed propositions:

- a) First, Dr. Netz claims that prices paid by direct purchasers for all or nearly all CRTs were elevated as a result of the alleged cartel. She rests this conclusion partly on her view that CRTs exhibited a price “structure” such that “prices

¹⁴ Netz Report, p. 33.

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for CRTs with different product configurations and sold to different customers would respond in similar ways to a price-fixing conspiracy.”¹⁵ She also relies on her view that the putative cartel was effective in setting actual CRT prices at levels comparable to target prices allegedly determined by the cartel.¹⁶

- b) Second, Dr. Netz contends that manufacturers and re-sellers passed-through the elevated cost of CRTs in a uniform and common manner (always passing through at least 100% of the elevated cost of CRTs) to end-users.¹⁷

36. In this section, I demonstrate that (a) industry characteristics and pricing evidence clearly show that there exists no structure to prices of CRTs and CRT finished products, and (b) that the alleged cartel – far from being uniformly successful – was mostly characterized by its inability to reach target prices identified by Dr. Netz. In the next section, I demonstrate that pass-through decisions by manufacturers and re-sellers were heterogeneous and a significant fraction of cost changes may not have been passed on at all to end-users by at least some re-sellers.

37. Overall, it is my conclusion that a finding of impact of the alleged collusion on all (or almost all) of the members of the proposed IPP class cannot validly be established by means of common evidence and common methods.

A. No Evidence of a “Structure” to Prices of CRTs and CRT Finished Products

38. Dr. Netz’s conclusion of common impact rests heavily on her claim that CRT prices exhibited a “structure” such that “prices for CRTs with different product configurations and sold to different customers would respond in similar ways to a price-fixing conspiracy.”¹⁸ To support this claim, Dr. Netz presents what she refers to as a “hedonic pricing analysis.” Below, I demonstrate that her claim that CRT prices exhibited such a structure is unsupported by her hedonic price analyses or the data. First, however, I describe the salient features of the CRT marketplace, the enormous heterogeneity in

¹⁵ *Id.*, p. 5.

¹⁶ *Id.*, p. 33.

¹⁷ *Id.*, p. 104.

¹⁸ Netz Report, p. 5.

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CRTs and CRT finished products, and the differentiation in the market forces to which various CRTs and CRT finished products were subjected. In view of this diversity, it is not surprising that CRT pricing dynamics do not exhibit anything like the structure that Dr. Netz claims. Instead, CRT and CRT finished-product price dynamics were highly differentiated during the class period.

Widely Differentiated CRTs and CRT Finished Products Resulted in Widely Different Dynamics for Their Prices.

39. CRTs were widely differentiated by features such as application (TVs or computer monitors), size, shape, resolution, the inclusion or exclusion of deflection yokes, type of mask, electrical properties, and the extent and type of customization. CRT prices also often varied based on the region in which the CRT was manufactured and the region in which it was sold. Finished-product prices varied widely based on the aforementioned characteristics of the CRT, as well on the type of sound system, HDTV capability, picture-in-picture capability, whether the product included a built-in VCR and/or DVD player or was bundled with a desktop PC, the retailer, the time period and a variety of other factors.

40. For example, CDTs were used solely in desktop computer monitors and CPTs were used solely in televisions. As Dr. Netz concedes,¹⁹ the two were not substitutes from the standpoint of manufacturers of monitors and TVs (i.e., customers of CRT manufacturers) because of differences in resolution, electrical current tolerances and brightness, among other factors.²⁰

¹⁹ Netz Report, pp. 16-17 (“[CDTs and CPTs] are not economic substitutes”).

²⁰ I understand that CPTs and CDTs are characterized by several different properties. A key product feature of CPTs is high brightness, while CDTs are characterized by high resolution. The two CRT types also exhibit different mask and phosphor structures. (SDCRT-0021278-SDCRT-0021294 at 1288). Additionally, there is a tradeoff between the two products with regards to resolution and the power the CRT is able to withstand. CDTs are not able to withstand the current of a television due to their thin masks needed to produce a high resolution, while CPTs do not have high enough resolution to be used in monitors but are able to withstand a higher current than CDTs. (Deposition of Tatsuo Tobinaga, July 16-17, 2012 (“Tobinaga (Panasonic,

(footnote continued ...)

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41. CDTs and CPTs were further differentiated along a variety of dimensions. For example, CPT pricing depended on CPT size, shape (curved or flat), and the type of “mask”²¹ included in the CPT. Similarly, CDT pricing depended on CDT size, shape, frequency,²² and glare.²³

42. A particular CRT model was not easily interchangeable with other CRT models, even those that may have shared similar basic features. Each CRT model was designed to fit the specific technical requirements of a particular finished product requested by a customer. For example, the connection points between the CRT and the external casing were specific to a given customer’s finished product design. Other features that were specific to a CRT destined for a particular finished product included the electrical components of the CRT.²⁴ Such customization limited the ability of a finished product manufacturer to interchange different CRT models for a given finished product. For example, according to a Philips witness, customers could not always interchange a

(... footnote continued)

MTPD) Deposition”), p. 143.) The evidence related to supply-side substitution is mixed. CRT production lines could be converted from producing CPTs to CDTs, and vice versa. However this change required time and effort. Most production lines produced a single application exclusively. For example, SDI’s CPT and CDT production was, for the most part, “completely separated”, the exception being small sizes. (Deposition of Jaemin Lee, June 6-7, 2012, (“Lee (SDI) Deposition”), pp. 113-114, 121-122.)

²¹ The “shadow mask” is a finely perforated screen that ensures that an electron beam strikes the correct phosphor dot. “In a colour picture tube, it is absolutely necessary to ensure that each of the three electron beams strikes only one phosphor in each triad. For this purpose, a mask, called a shadow mask or an aperture mask, is inserted between the neck of the picture tube and the phosphor dot screen.” (Bali, S. P. (1994). *Colour Television: Theory and Practice*. Delhi: Tata McGraw-Hill Publishing Company Limited. p. 83)

²² The “frequency,” also called the refresh rate, is the number of times per second the image on a display device is refreshed or restroked on the screen. (Graf, R. F. (1999). *Modern Dictionary of Electronics, 7th Edition*. Woburn, MA: Butterworth-Heinemann.)

²³ Lee (SDI) Deposition, pp. 38, 101; Deposition of Hirokazu Nishiyama, July 17-18, 2012 (“Nishiyama (Panasonic, MTPD) Deposition”), pp. 73-75, 144-145; Deposition of Koji Kurosawa, July 30, 2012 (“Kurosawa (Toshiba Corp.) Deposition”), pp. 93-94, 98-99.

²⁴ Tobinaga (Panasonic, MTPD) Deposition, p. 142; Deposition of Toru Iwasawa, July 11, 2012 (“Iwasawa (Hitachi) Deposition”), pp. 29-30.

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Philips CRT for another manufacturer's CRT without significant modifications to the finished product.²⁵ An SDI witness testified that customers would take up to a year to qualify new suppliers of CRTs.²⁶

43. In addition, some CRTs were sold by manufacturers such as Toshiba that were vertically integrated for at least part of the class period (i.e., the CRT manufacturer was affiliated with a downstream manufacturer of CRT TVs and/or CRT monitors), while other CRTs were supplied by CRT manufacturers such as Chunghwa that were not integrated.²⁷

44. Exhibit 1A illustrates the substantial amount of dispersion in each month during the class period in the CRT prices charged by the seven defendant manufacturers that have produced CRT sales data in the instant matter.²⁸ Taking August 2001 as an illustrative example, 10% of CRT prices that month were below \$38 or less and 10% were above \$195 or more (more than 5x higher). Substantial price variation can be observed in Exhibit 1A for other months. This price variation was due to differences in product and customer characteristics.²⁹ Similarly, Exhibit 1B shows that CRT finished product prices also exhibited substantial dispersion. The exhibit shows the dispersion in prices charged

²⁵ Deposition of Roger de Moor, July 31 - August 1, 2012 ("de Moor (PENAC) Deposition"), pp. 141-143.

²⁶ Lee (SDI) Deposition, p. 213.

²⁷ I understand that the following defendant CRT manufacturers were majority-owned by a corporate parent that also owned a majority share of a finished-product manufacturer: Hitachi, LG (prior to July 2001), Philips (prior to July 2001), Panasonic (prior to 2003), Toshiba (prior to 2003), and MTPD (starting in 2003). Chunghwa, LPD (starting in July 2001), and SDI were not.

²⁸ Six defendants produced CRT sales data in the instant matter: Chunghwa, Hitachi, MTPD, Panasonic, SDI and Toshiba. LPD produced data from Philips' legacy CRT business that it acquired in July 2001. Unless otherwise noted, analyses presented in this report that pertain to CRT prices are based on the sales data from these seven sources.

²⁹ Each observation in Exhibit 1A represents the volume-weighted average price at which a specific CRT model was sold to a specific customer in a specific month.

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for CRT TVs and monitors by four retailers: Best Buy, Costco, Office Max, and Zones.³⁰ As seen in the exhibit, there is considerable variation in finished product prices – both within and across retailers. This variation is due to the variety of TVs and monitors offered by each retailer in a given month, changes in that mix over time, and differences across retailers.

45. The resulting dispersion in prices can be illustrated using prices reported by named IPP class member, Steve Ganz. Mr. Ganz purchased a 27-inch Toshiba CRT TV from Best Buy in May 2005 for \$329.99.³¹ In the same month, Best Buy sold 27-inch Toshiba CRT TVs at prices ranging from \$25 to \$719.99. About 34% of the 27-inch Toshiba CRT TVs Best Buy sold in May 2005 were priced below \$250 and 17% were priced above \$400.³²

46. Prices of the various CRTs and CRT finished products also *changed* in heterogeneous ways. As illustrated in Exhibit 2A, month-to-month changes in CRT prices varied substantially in their direction and magnitude. In nearly every month during the class period, the month-to-month price changes of CRT products ranged from increases of more than 5% to decreases of more than 5%. Prices frequently moved in opposite directions. For example, between June 2002 and July 2002, almost 26% of CRT prices declined by at least 2%,³³ while about 23% of CRT prices increased and another 10% did not change.³⁴

³⁰ These four retailers are noted here as illustrative examples. I have analyzed data produced by thirteen retailers: Amazon, Best Buy, Buy.com, CDW, Circuit City, Costco, Fry's, Office Max, PC Connection, PC Mall, Sam's Club, Walmart, and Zones. The prices these retailers charged for CRT finished-products varied widely within and across each retailer. Unless otherwise noted, analyses presented in this report that pertain to retail CRT finished-product prices are based on the sales and/or procurement cost data for these thirteen retailers.

³¹ Indirect Purchaser Plaintiffs' Consolidated Amended Complaint, 16 March 2009, p. 5.

³² Best Buy Sales Data in this matter.

³³ Two percent is a material change for a single month. For context, average CPT and CDT prices respectively declined by 0.6% and 1% per month during the class period, which was enough to produce a cumulative decline of nearly 60% and 80% in average CPT and CDT prices,

(footnote continued ...)

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47. Similarly, Exhibit 2B shows the substantial variation in any given month in changes in CRT finished product prices at a sample of four retailers. Month-to-month changes in retail prices of individual TVs and monitors at Costco, for example, rarely exceeded 1% in either direction. In contrast, in virtually every month, some retail CRT TV or monitor prices at Best Buy increased by more than 30% while others decreased by more than 30%. The variation in price changes at Zones and OfficeMax lay at different points on the continuum between Costco and Best Buy, but contemporaneous price changes varied widely at both. An analysis of a broader array of retailers reveals that CRT finished product prices frequently moved in opposite directions. For example, between September 2003 and October 2003, 24% of retail CRT finished product prices declined by at least 5%, while about 44% of retail finished product prices increased.³⁵

48. This variation in the changes in prices of CRTs and CRT finished products implies that knowing prices of a subset of CRTs or CRT finished products increased during a certain period would not be a basis reliably to infer that prices of all (or most) other CRTs or CRT finished products also increased.

49. Further evidence of divergent CRT price changes is provided in Exhibit 3A, which shows that changes in the *average* price of CDTs provided an extremely poor prediction of contemporaneous changes in CPT prices and vice versa. For example, in the months that experienced the largest changes in the average CDT price (measured in terms of the CDT Fisher Price Index) during the March 1995 to November 2007 period, 48% of CPT

(... footnote continued)

respectively, over the course of the class period. (Here, changes in “average” CPT and CDT prices refers to changes in the Fisher Price Indices of each, as illustrated in Exhibit 6.)

³⁴ This was not atypical. In roughly half the months during the class period, at least 20% of CRT prices declined (month-over-month) by 2% or more while at least 20% of CRT prices increased or remained unchanged during the same period.

³⁵ This was not atypical. In 130 of the 152 months in the class period, at least 20% of retail CRT finished-product prices declined (month-over-month) by 5% or more while at least 20% of TV and monitor prices were increasing. (These estimates are based on sales prices of all CRT finished-products sold at the thirteen retailers identified in the notes to Exhibit 3B.)

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prices either changed in the opposite direction or did not change at all.³⁶ (See Exhibit 3A.) Similarly, changes in the CPT Fisher Price Index are poor predictors of changes in specific CDT prices. Specifically, in the months that experienced the largest changes in the global CPT Fisher Price Index, 35% of CDT prices either changed in the opposite direction or did not change at all.^{37, 38}

³⁶ I implemented this test as follows: I first identified months that experienced the largest month-to-month changes in global CDT average prices (as measured by the CDT Fisher Price Index) during the class period. Specifically, I identified the 25% of months that saw the largest changes in the CDT Fisher Price Index. (During these months, the CDT Fisher Index changed by at least 2% per month.) For each of these months, I assessed the fraction of CPT prices that changed in the opposite direction and the fraction of prices that did not change during the same time period. (A CPT “price” was defined as the monthly weighted average price paid by a particular customer for a particular CPT model. Prices were considered not to have changed if the change was less than one cent. The average price of a CDT model during the analysis period was about \$71 and a CPT model was about \$67.) I then averaged the results across the months in the sample using monthly CPT sales volumes as weights. This methodology is described in the notes to Exhibit 3A.

³⁷ As an alternative to the test described above, I estimated the correlation coefficient between the CDT and CPT Fisher Indices for North American sales between October 1997 and September 2004 (the period for which I can identify North American sales). The coefficient is 0.021 and is not statistically different from zero (at the 5% level). The correlation coefficient between two Fisher Price Indices of various categories of CRTs is an overly conservative measure of whether prices move together because it focuses on *average* prices and thus may mask the considerable heterogeneity in price movements across specific models of CRTs purchased by specific customers over time. In my view, for the analysis of the validity of the proposed class, it is more instructive to focus on whether the prices that specific customers paid for specific CRT models tended to move together as per the analysis in Exhibit 3A.

³⁸ The metric of co-movement in CRT prices I employ in Exhibit 3A and in Exhibit 3B almost surely overstates the extent to which a hypothetical overcharge in one CRT category would cause prices in the other CRT category also to be higher. In my analysis, which tracks changes in prices over time, inter-temporal shocks that directly affect all CRT prices are likely to cause prices to move in the same direction for reasons that have nothing to do with demand-side or supply-side substitution. For example, the price of natural gas likely affects the cost of manufacturing glass of all types, and hence the prices of flat glass panes used in windows of buildings may be correlated with the prices of CRTs, which also use glass. However, such a correlation does not imply that if a cartel increased the price of either CRTs or flat glass panes that it would necessarily result in an increase in the price of the other. Any co-movement caused by inter-temporal market-wide shocks that directly affect all CRT prices has no bearing on whether a hypothetical overcharge in one product category would cause prices for the other

(footnote continued ...)

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50. Moreover, month-to-month price changes vary widely across different-sized CPTs. For example, in the months from March 1995 to November 2007 that experienced the greatest changes in the Fisher Price Index for *large* CPTs, 48% of *medium* CPT prices and 54% of *small* CPT prices either changed in the opposite direction or did not change at all.³⁹ (See Exhibit 3A.) The diversity of price movements depicted in Exhibit 3A shows that different market forces affected large and medium/small CPTs (or the same forces affected them differently). In view of this, any hypothesized evidence that the alleged cartel succeeded in elevating the price of small/medium CPTs would not necessarily imply that prices were also elevated for large CPTs (and vice versa).

51. Even when the average (Fisher Index) price of CPTs changed from one month to the next, a considerable share of CPT prices moved in the opposite direction or remained unchanged. (See Exhibit 3A.) The same is true for CDTs.

52. Similar results obtain for prices of CRT finished products as shown in Exhibit 3B. For example, in the months that experienced the greatest changes in average retail CRT TV prices (based on a Fisher Price Index) across a sample of retailers, 35% of CRT monitor prices at the same retailers changed in the opposite direction.

53. This kind of variation in price movements makes proving antitrust impact to all direct and indirect purchasers in the U.S. based on a “price structure” theory implausible. By way of an example (noted above), between September 2003 and October 2003, 24% of retail CRT finished product prices declined by at least 5%, while about 44% of retail finished-product prices increased during the same month. Suppose, hypothetically, that the evidence indicated that collusion affected the pricing of those CRT finished products whose prices remained the same or increased from September 2003 to October 2003.

(... footnote continued)

product category also to be higher, because a hypothetical overcharge does not involve an increase in price over time, but rather an increase in price relative to a counterfactual but-for world *at the same point in time*.

³⁹ “Small” CPTs are defined as CPTs that are smaller than 20 inches in diameter. “Medium” CPTs are defined as CPTs between 21 and 29 inches in diameter. Large CPTs are defined as CPTs that are at least 30 inches in diameter.

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None of the analyses in Dr. Netz's report demonstrate that proof of cartel impact on CRT finished products whose prices increased from September 2003 to October 2003 can somehow also serve as common proof of antitrust impact with regard to CRT finished products whose prices actually declined during the same period.

54. The heterogeneous price dynamics of CRTs and CRT finished products likely were the result of differentiated features of these products and more importantly the result of substantially different market forces that influenced the prices of different CRT product segments at various points during the class period. From 2000 onward, fierce competition from LCD and plasma display technologies rapidly shrank the CRT share of the display market. This development affected certain types of CRTs more than others. I turn to this next.

Substantially Different Market Forces, Such as Competition from LCD and Plasma Technologies, Influenced CRT and CRT Finished Product Prices Differently during the Alleged Class Period.

55. CRT finished products' shares of desktop monitors and TVs sold globally began to decline around 2000. Exhibit 4A shows that CRT desktop monitors accounted for 91% of computer monitor sales in early 2001 but only 10% of such sales by the end of 2007. CRT TVs⁴⁰ share of global TV sales also declined during this time period, albeit more slowly. Exhibit 4A shows that CRT TVs accounted for nearly 100% of global TV sales in early 2001 but only 48% by the end of 2007. During this time, CRT TVs' share of North America TV sales declined more than in much of the rest of the world. For example, by the end of 2007, CRT TVs' share of TV sales in North America had shrunk to 14% compared to a global share of 48%. (Exhibits 4A and 4B)

⁴⁰ I exclude rear-projection CRT TVs from my analyses since I understand that they are not part of the instant litigation.

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56. The decline in CRT finished-products' share of global TV and monitor sales was a result of competition from LCD and plasma technologies,⁴¹ and the share trends evident in Exhibit 4A and Exhibit 4B show that the new technologies impacted CRT monitors earlier and to a greater extent than CRT TVs.⁴²

57. LCD and plasma competition impacted large CRT TV sales earlier and more significantly than sales of small and medium CRT TVs. As evident in Exhibit 5A, the global penetration of large CRT TVs⁴³ (relative to other technologies) shrank from 78% in 2001 to just 11% by late 2007, while the penetration of small and medium CRT TVs declined by less – from nearly 100% to about 78% during the same period. Large CRT TVs fared poorly in North America, declining from 66% in early 2001 to just 5% by late 2007, while small and mid-sized CRT TVs' share fell from almost 100% in early 2001 to 38% by late 2007. (See Exhibit 5B)

58. Given the differential impact of LCD and plasma competition on various segments of CRTs, it would not be surprising to find very different dynamic price patterns for various

⁴¹ Contemporaneous documents refer to the displacement of CRTs by LCDs and plasma as the following examples illustrate:

- “As LCD prices fall CRTs will lose share;” “CRTs are boxy, heavy, thick and consume more power than competing technologies;” “Consumers [sic] belief that digital/HDTVs require non-CRT solution and that the CRT forma factory is old fashioned.” (TAEC00006084. Shulklapper, Andrew. DisplaySearch HDTV Forum 2004: Accelerating the HDTV Transition, August 24-26, p. 11. See also pp. 4-17.)
- “The PC monitor market is going through some significant changes as the transition from cathode-ray tubes (CRTs) to LCDs begins to hit with full force. Worldwide revenue for LCD monitors will outpace CRT revenue in 2003, and the crossover for worldwide unit shipments will occur in 2004.” (TAEC00006176. Gallo, J. and O'Donnell, B. “Worldwide PC Monitor Forecast and Analysis, 2002-2007: Looking Ahead”, IDC, May 2003 at p.1. See also pp. 6, 8-32.)

⁴² Contemporaneous documents also acknowledge the differential impact of LCD competition on monitors and TVs. See, e.g., PHLP-CRT-049353(February 2004 presentation) which notes that “LCD technology development has exceeded all expectations” and that “CRT monitors are more severely affected by LCD demand” (p.3).

⁴³ For the purpose of my analyses, “large” CRT TVs are defined to be TVs that are at least 30” in viewable size.

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segments of CRTs. Consistent with this view, my analyses of CRT pricing data demonstrate that global prices of CDTs typically fell more and earlier than prices of CPTs. Moreover, global prices of large CPTs fell more than for small and medium CPTs, and global prices of flat CPTs (which were closer substitutes for LCD and plasma TVs⁴⁴) declined more than prices of curved CPTs during much of the relevant period.⁴⁵

59. The different trends in prices of CDTs and CPTs are illustrated in Exhibit 6. The chart tracks average prices (measured using chained Fisher Indices^{46,47}) of CPTs and CDTs sold globally during the class period. As illustrated in Exhibit 6, the average prices of CDTs and CPTs fell during much of the period, but the average price of CDTs declined

⁴⁴ See, e.g., “To compete with the flat panels, the CPT makers and TV OEMs are boosting production of flat-face CRTs.” (iSuppli, “Flat-Panel Sets Gain Strong Footing in TV Market”, Television Systems, Market Tracker – Q1 2006, CHU00154658 – CHU00154694 at CHU00154673.)

⁴⁵ Despite the impact that competition from LCD and plasma technologies had on CRTs, Dr. Netz testified that she did not analyze whether LCD or plasma rates varied by geographic region (Deposition of Janet Netz, November 15, 2012 (“Netz Deposition”), p. 51) or whether the degree of competition CRTs faced from LCDs varied by CRT size. (Netz Deposition, pp. 53, 56-57)

⁴⁶ The month-to-month change in the Fisher Price Index for CPTs (for example) represents an average of the price changes for CPT models sold in both months. The price changes across months 1 and 2 are averaged in two ways – once using the month 1 sales volumes and once using the month 2 sales volumes. The change in the Fisher Price Index represents the geometric mean of the two average price changes.

⁴⁷ Fisher Indices (or more precisely, chained Fisher Indices of the type I employ) are an accurate way to track changes in average prices of CRTs over time because they remove the effect of changes in product mixes from price trends. (Diewert, W. E. (1993). The Early History of Price Index Research & Fisher Ideal Output, Input and Productivity Indexes Revisited. In W.E. Diewert and A.O. Nakamura (Eds.), *Essays in Index Number Theory, Volume I*, Elsevier Science Publishers. pp. 58, 320-330; International Labour Organization. (2004). *Consumer Price Index Manual: Theory and Practice*. International Labour Organization. pp. 6-32.) This is important because the mix of CRTs changed substantially during the class period, with the advent of higher-quality flat, wide-screened, high resolution CRTs that were introduced in response to LCD and plasma competition. Since these high-quality CRTs were priced higher than lower quality CRTs, ignoring the improvement in product quality over time would mask declines in prices for CRTs of similar quality, and hence I remove the effects of changes in product mix by using Fisher Indices.

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more than the average price of CPTs. This is consistent with the view that CDTs faced greater competition from LCDs than did CPTs.

60. Although prices of CPTs and CDTs generally trended downward during the relevant period, the month-to-month changes in CPT prices frequently differed from changes in CDT prices. As explained above in the context of Exhibit 3A, changes in the average prices of CPTs were poor predictors of contemporaneous changes in the prices of CDT models (and vice versa). As such, any evidence about the impact of collusion on the pricing of CPTs cannot be assumed to be relevant and is likely not relevant to the pricing of CDTs (and vice versa) since they had substantially different market forces acting on them and consequently also had substantially different patterns of changes in their prices. This implies that these products need to be examined separately in assessing the impact of the alleged cartel.⁴⁸

61. In addition to the differences in price dynamics between CPTs and CDTs, various categories of CPTs also exhibited differentiated price dynamics. For example, prices of larger CPTs exhibited different trends from prices of smaller CPTs. Specifically, the Fisher Price Index for larger CPTs declined more rapidly than the Fisher Price Indices for small and mid-sized CPTs during the relevant period. This pattern is illustrated in Exhibit 7. Moreover, as explained before, their month-to-month changes demonstrate highly differentiated pricing patterns. (See Exhibit 3A.)

62. Prices of flat CPTs declined more rapidly than prices of curved CPTs, which is unsurprising since flat TVs were likely to be closer substitutes for LCDs and plasma TVs than CRT TVs with curved screens.⁴⁹ Exhibit 8 shows the Fisher Index of global prices of

⁴⁸ Dr. Netz also does not assert a price structure exists between CDTs and CPTs, and she conducts her hedonic pricing analyses – which she claims offer support for the existence of a price structure – separately for CDTs and CPTs. Netz Report, p. 68 (“I estimated two hedonic regressions, one for CPTs and one for CDTs”); p. 70 (“I fit the model separately for CDTs and CPTs”); and Exhibits 19-24. This treatment is consistent with her finding that CDTs and CPTs “are not economic substitutes.” (Netz Report, pp. 16-17.)

⁴⁹ See, e.g., “To compete with the flat panels, the CPT makers and TV OEMs are boosting production of flat-face CRTs.” (iSuppli, “Flat-Panel Sets Gain Strong Footing in TV Market,”

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flat CPTs declining more than the prices of curved CPTs for much of the period since September 2000. Moreover, as explained above, their month-to-month changes demonstrate highly differentiated pricing patterns between flat and curved CPTs. (See Exhibit 3A.)

63. In sum, competition from newly emergent LCD and plasma technologies affected different categories of CRTs differentially, and this differentiated impact is evident in the differentiated patterns of CRT pricing.

Conduct Directed at CRT Prices Outside the United States Need Not Have Elevated CRT Market Prices in the United States.

64. In addition to the differentiated price dynamics across product categories, there is substantial evidence of diverse price dynamics across geographic regions. This is another source of differentiation in CRT price dynamics, and it is particularly relevant here because Plaintiffs allege a global CRT cartel, but the proposed IPP class is comprised of end users located only in the U.S.

65. The CRT prices identified by Dr. Netz as the “target prices” set by the putative cartel rarely refer to prices of CRTs sold specifically in the U.S. or North America.⁵⁰ If, in fact, the alleged cartel typically set target prices with no reference to the U.S. or North America, and if U.S./North American CRT prices and market conditions were materially different from the rest of the world, then members of the IPP class that purchased finished products made using CRTs manufactured in the U.S. or North America

(... footnote continued)

Television Systems, Market Tracker – Q1 2006, CHU00154658 – CHU00154694 at CHU00154673.)

⁵⁰ Of the 183 documents relied upon by Dr. Netz to identify “target prices” only a handful contain target prices that are expressly relevant for North America/U.S. (Netz Report, Exhibit 2, pp. 1-3; see e.g., Visitation Report, CHU00029138-CHU00029143 at CHU00029140, March 25, 2000; Visitation Report, CHU00029171-CHU00029174 at CHU00029172, October 27, 1999; Marketing Visitation Report, CHU00030020-CHU00030025 at CHU00030022, June 18, 2004; Market Visitation Report, CHU00030071-CHU00030078 at CHU00030078, November 7, 2003; Visitation Report, CHU00029262-CHU00029264 at CHU00029264, September 26, 1998.)

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potentially may have been unharmed even if the alleged cartel successfully elevated prices of CRTs in the rest of the world.

66. Market conditions for CPTs in North America were indeed different from those in the rest of the world. LCD and plasma technologies penetrated the U.S. market earlier and faster than many other parts of the world. For example, by late 2007 CRT TVs' share of TV sales in North America had shrunk to 14% compared to a global CRT TV share of 48%.⁵¹ CRT demand started to decline in North America and in other advanced economies even as demand grew in other regions.⁵² Greater competition from LCDs in the U.S. would likely have reduced the impact of the putative cartel in the U.S. relative to the rest of the world. Moreover, the mix of products sold in North America was not the same as in other regions. For instance, CPTs sold in North America were far more likely to be larger than CPTs sold for use in other regions. About 38% of CPTs sold in North America between October 1997 and March 2003 were at least 30" in size but only about 7% of CPTs sold in other regions in the same period were of that size.⁵³

67. A significant difference between CDTs and CPTs is that, while few CDTs were produced in North America (most of the monitor production was in Asia), a substantial volume of CPTs used in TVs sold in the U.S. was manufactured in North America.⁵⁴

⁵¹ See Exhibits 4A and 4B.

⁵² MTPD-0300203.ppt, at slides 8, 9, 10, and 16.

⁵³ These figures were calculated by identifying observations with a North American (U.S., Canada, or Mexico) or foreign address within Dr. Netz's CRT sales data set. Address information was available for CPTs for two manufacturers: Hitachi and Panasonic. The data range reflects the time period over which the data for these two firms overlap.

⁵⁴ See the following reports by Fuji Chimera, an analyst firm that tracks CRT sales: *Forecasts and Trends for Flat Panel Displays and Their Applications*. (2000). p. 142. Fuji Chimera Research Institute, translated by InterLingua; *Flat Panel Display Applications: Trends and Forecasts*. (2001). p. 180. Fuji Chimera Research Institute, translated by InterLingua; *Trends and Forecasts: Flat Panel Display Applications* (2002). p. 203. Fuji Chimera Research Institute, translated by InterLingua; *Flat Panel Display Applications: Trends and Forecasts*. (2004). p. 236. Fuji Chimera Research Institute, translated by InterLingua; *Flat Panel Display Applications: Trends and Forecasts*. (2005). p. 231. Fuji Chimera Research Institute, translated by InterLingua; *Trends and Forecasts: Flat Panel Display Applications*. (2006). p. 253. Fuji

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Prices of CPTs sold in North America by at least some Defendants were primarily determined by their North American divisions, i.e., they were not set by global head offices.⁵⁵

68. Given these facts, it would not be surprising if CPT prices in the U.S. and North America were differentiated from the rest of the world. Indeed, CPT sales data produced by the Defendants show that prices of CPTs sold in North America had substantially different patterns of changes than prices of CPTs sold in the rest of the world.

Specifically, in the months that experienced the greatest changes in average CPT prices (measured in terms of the Fisher Price Index) sold outside North America, 56% of CPT prices in North America either changed in the opposite direction or did not change at all. (See Exhibit 9.)

Dr. Netz's Hedonic Regressions Mask the True Changes in Prices.

69. In light of the diverse patterns of price movements among different CRTs, CRT finished products, and regions, it is highly implausible that evidence that is common across the class could prove that most of the members of the proposed class were impacted by the alleged collusion over the pricing of CRTs. Rather, many individualized inquiries would be necessary to assess whether the observed prices are higher than they would have been absent the alleged collusion for the many different CRT finished products with diverse patterns of price movements over time.

70. Despite the substantial variation in product and other characteristics affecting CRT prices and the clarity of the data regarding the wide dispersion in CRT price levels and changes, Dr. Netz claims that CRT prices exhibited a “structure.” Although she eschews

(... footnote continued)

Chimera Research Institute, translated by InterLingua; *Flat Panel Display Applications: Trends and Forecasts*. (2007). p. 226. Fuji Chimera Research Institute, translated by InterLingua.”

⁵⁵ For example, SDI's Jaein Lee testified that SDI allowed its regional staff to take the lead in making pricing decisions because market conditions differed greatly across regions (although regional representatives would consult the head office staff for unusually large price changes). (Lee (SDI) Deposition, pp. 185-187, 189).

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a direct test of price co-movements and structure, Dr. Netz does perform what she regards as an indirect test of price structure to support her assertion that such a structure exists. Specifically, she presents the results from a “hedonic regression” that she contends supports her view. However, her hedonic regression analysis does not support the view that CRT prices exhibit a price structure. In fact, a properly designed hedonic regression analysis demonstrates the opposite, i.e., that price movements were differentiated across various categories of CRTs.

71. Dr. Netz estimates a series of hedonic regressions using CDT and (separately) CPT data. These regressions attempt to predict CDT and CPT prices based on (i) a few product characteristics⁵⁶ of these CRTs, (ii) variables to capture time trends in prices,⁵⁷ and (iii) customer-manufacturer fixed effects (“buyer-seller dummy” variables) to reflect the impact of interactions between individual customers and manufacturers. She finds that a majority of CRT price variation (71% for CDTs and 89% for CPTs) can be explained based only on product characteristics and the time trend variables,⁵⁸ which she concludes shows that “[T]here is a common pricing structure; CRT prices are largely determined by a formula based on the characteristics of the product and the period in which the transaction took place.”⁵⁹

⁵⁶ These characteristics are: size, aspect ratio, whether the CRT was sold with or without a deflection yoke, whether the deflection yoke (if any) was calibrated, and, in a subset of the regressions, whether the CRT was curved or flat.

⁵⁷ By including a linear time trend variable and a time squared variable in her regressions, Dr. Netz implicitly assumes that time trends affected all CDTs or CPTs in an identical fashion.

⁵⁸ Since Dr. Netz can identify the “shape” of a given CRT (i.e., whether the CRT is flat or curved) only for Panasonic’s, MTPD’s, and SDI’s sales data, she also runs separate hedonic regressions just for these three manufacturers, and compares the results with and without a shape variable (See Netz Report, Exhibits 23 and 24). Her results show that adding shape to these regressions has a very minimal impact on the “Total explained portion of variance (R-squared)”: for CDTs, adding shape to the regression model increases R-squared from 94.35% to 94.36% (Netz Report, Exhibit 23), and for CPTs it increases R-squared from 96.37% to 97.08% (Dr. Netz’s Exhibit 24). Without loss of generality, I therefore focus in my analysis on the hedonic regressions she performs using the seven Defendants’ data. (Netz Report, Exhibits 21 and 22)

⁵⁹ Netz Report, p. 71.

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72. A critical question when assessing whether impact can be established through common proof is whether a cartel-induced elevation in the price of one type of CRT would necessarily increase the price of similar CRTs. For example, if the alleged cartel were to increase the prices of 14-inch CPTs, would the prices of 21-inch CPTs (that are otherwise identical) also increase – even if the cartel did not target 21-inch CPTs? If “yes,” then that would be consistent with the existence of a price structure (at least between these two types of CPTs) along the lines of what Dr. Netz appears to propose.

73. However, this question is not directly answered by Dr. Netz’s hedonic regressions.⁶⁰ They report the average differential in price between various sizes of CPTs (and CDTs) during the relevant period. Consider the following hypothetical example, in which there are only two periods and two products: the price of all 14-inch CPTs increased from \$50 in period 1 to \$70 in period 2, whereas the price of all otherwise identical 21-inch CPTs declined from \$200 in period 1 to \$180 in period 2. Assuming that unit sales of each product were the same across both periods, a hedonic approach of the type used by Dr. Netz would report that 21-inch CPTs had an average premium of \$130 in the two periods. This method fails to reflect the fact that the prices of the two types of CPTs moved in opposite directions between period 1 and period 2. Clearly, the fact pattern in this hypothetical would not support the claim that an increase in 14-inch CPT prices must necessarily result in an increase in 21-inch CPT prices.

74. A more direct approach to testing whether the existence of a cartel-induced elevation in the price of 14-inch CPTs would necessarily increase the price of 21-inch CPTs would examine whether the average premium commanded by 21-inch CPTs over 14-inch CPTs actually changed over time. If it did, as in the above hypothetical example, it would indicate that increases in 14-inch CPT prices do not necessarily lead to increases in 21-inch CPT prices.

⁶⁰ Dr. Netz relies on the proposition that her hedonic regressions explain much of the variation in CRT prices to support the notion that her hedonic regressions imply a price structure. However, as I explain later in this section, Dr. Netz’s hedonic regressions are unable to explain a material amount of CRT price variation.

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75. To analyze whether the average price difference between two different CRT sizes vary over time, I implemented Dr. Netz's regression (without buyer-seller dummy variables) separately for each year for which data were available and recorded the coefficients in each year for the most popular CDT and CPT sizes.^{61, 62} The results, presented in Exhibit 10A and Exhibit 11A, look at pairs of CRT sizes and show the average price premium (in %) in each year for the larger CRT over the smaller CRT, holding other CRT characteristics constant. For example, in the CPT chart Exhibit 11A, the red line shows that in 1995, 29-inch CPTs were priced 104% above 21-inch CPTs on average based on Dr. Netz's hedonic regression applied annually. By 2000, this premium increased to 207%, after which it declined to 147% the following year. Clearly, the relative prices of CRTs varied substantially even over short time periods. The substantial swings observed in relative prices undermine Dr. Netz's claim that her hedonic regressions provide any evidence of a price structure that links prices and changes in prices of different CRTs.

76. Moreover, Dr. Netz's hedonic regressions provide no support for the existence of a price structure even within a given year. If CRT prices exhibit a price structure, these regressions should show that within a given year, the price premiums for larger CRTs relative to smaller ones should be fairly similar across manufacturers. The results of this analysis are presented in the tables in Exhibit 12 and Exhibit 13. These exhibits clearly show that in many years the average price premiums by size varied substantially across

⁶¹ Specifically, I examine 14, 15, and 17-inch CDTs and 14, 21, and 29-inch CPTs, which are the only application-size combinations that account for at least 10% of CRTs sold during the analysis period.

⁶² In Exhibit 10A, Exhibit 11A, Exhibit 12 and Exhibit 13, I rely on hedonic regressions without buyer-seller dummies that Dr. Netz includes in her regressions because she contends that buyer-seller interactions (captured by the buyer-seller dummies) do not have a material influence on CRT prices. ("If transaction prices were driven primarily by individual factors such as the nature of the class member or the outcome of a specific negotiating procedure between each Defendant and each direct purchaser, then I would not find a common pricing structure determined by common CRT characteristics that would explain a majority of the variation in prices." Netz Report, p. 71.) In any event, even when these buyer-seller interactions are included in the regressions, the price premiums for bigger CRTs vary considerably across years.

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manufacturers. For example, in 1997, the average price premium for 15-inch CDTs relative to 14-inch CDTs varied from 45% (for Chunghwa) to 5% (for Philips), and the average price premium for 17-inch CDTs relative to 15-inch CDTs ranged from 187% (for Philips) to 53% (for Toshiba). CPT prices exhibit similar differences. The differences across manufacturers varied across years. Again, these results show that hedonic analyses of the sort conducted by Dr. Netz provide no support for a CRT “price structure.”

77. Dr. Netz cites to the high R-squared statistic in her hedonic regressions (i.e., the fact that observed product characteristics included in her regressions explain a substantial portion of the variation in CRT prices) as evidence of a price structure determined mostly by a few observable product characteristics and time trends.⁶³ However, a relatively high R-squared in hedonic regressions is entirely consistent with individual factors such as customers’ bargaining power and the process of negotiations as well as product characteristics omitted from her analysis having an important role in determining prices.

78. One way to demonstrate that the portion of unexplained variation in the regression could be material (despite a high R-squared), and therefore that excluded transaction characteristics may be material drivers of prices, is to compare actual observed prices⁶⁴ with the “predicted price,” i.e., the price predicted by the regression based on the characteristics it includes. If the product features included in Dr. Netz’s regression specification explain a sufficient amount of the variation in actual CRT prices such that excluded price drivers such as customer and manufacturer bargaining power have no

⁶³ Netz Report, pp. 68-69.

⁶⁴ The dependent variable in Dr. Netz’s hedonic regressions is the average actual price paid by a specific customer for a specific CRT model (a particular manufacturer often sells many models of a given application and size at a given point in time) in a specific month. In addition to using actual sales prices of CRTs as dependent variables, Dr. Netz also uses as dependent variables “target prices” identified by her as prices set by the alleged cartel. Target prices are discussed in Section III.B of this report. In this section on hedonic regression analysis, I focus on actual prices since target prices are irrelevant in this context given that actual prices for the most part did not follow target prices (as I explain in Section III.B) and actual prices are the proper focus of any analysis of impact of the alleged cartel.

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material influence on CRT prices, then the difference between actual CRT prices and the prices predicted by Dr. Netz's hedonic regressions should be small and not material.

79. In order to test this prediction, I calculated for each observation the percentage gap between the actual price and the price predicted by Dr. Netz's hedonic regressions.⁶⁵ I find that actual prices deviated materially from predicted prices. For context, several "target price" documents cited by Dr. Netz indicate that Defendants considered price differentials between manufacturers of 5% or less to be enough to shift sales and shares.⁶⁶ Thus, if Dr. Netz's hedonic regressions leave no material price variation unexplained, then the gap between the price predicted by these regressions and the actual price should rarely exceed 5%. In fact, I found the opposite; very rarely are prices predicted by Dr. Netz's regression within a 5% range of actual prices of CDTs, as seen in Exhibit 14A. In all but one year, the (absolute) difference between actual observed CDT prices and prices predicted by Dr. Netz's hedonic regressions exceed 5% for more than three fifths of observations. A similar conclusion applies to CPTs. (See Exhibit 15A.)⁶⁷ Thus, a material amount of CRT price variation arises from factors not included in Dr. Netz's hedonic regressions. Put differently, factors such as customers' bargaining power and interactions with vendors and unobserved product features matter for CRT pricing.

⁶⁵ I did this analysis without the individualized buyer-seller dummies since Dr. Netz discounts the importance of these dummies and contends that observed product characteristics alone are sufficient to reliably determine CRT price. However, including them does not qualitatively alter results.

⁶⁶ See, e.g., CPT Sales Division Customer Contact Report, October 4, 1999, CHU00028599; CDT Market Report, March 28, 2004, CHU00031249.

⁶⁷ The gap between actual CRT prices and prices predicted by Dr. Netz's hedonic regressions is substantial. For one quarter of the observations, the (absolute value of the) gap is at least 20% for CPTs and CDTs. (Put differently, the 75th percentile of the absolute value of the gap – expressed in percentage terms – equals 20%.)

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B. No Uniform, Effective and Sustained Collusion

80. Dr. Netz contends that the cartel agreed to set “target” prices and that these target prices were above the competitive level.^{68, 69} She then compares the actual prices charged by six⁷⁰ Defendants for CRTs with the target prices that Defendants allegedly agreed to implement.⁷¹ She contends that the average CRT prices in a typical month were comparable to or above the relevant average target prices.⁷² From this claimed finding, she infers that the alleged cartel’s efforts at setting target prices succeeded in elevating actual prices of most CRTs above competitive levels (which she assumes are lower than the alleged target prices).⁷³

Economic Theory Suggests that, Contrary to Dr. Netz’s View, the CRT Cartel Was Potentially Ineffective at Raising Prices of CRTs across the Proposed Class.

81. Economic theory has established that cartels in industries with certain features and conduct are less likely to be effective than cartels in industries without those features.

⁶⁸ Specifically, Dr. Netz explains that “[b]ecause cartel members must be compensated for the expense and risk they incur by participation in a cartel, a cartel will set target prices above the competitive level.” (Netz Report, p. 61.) However, in her deposition, Dr. Netz conceded that it could be rational for firms to participate in a cartel even if the cartel was only effective at increasing prices for some screen sizes, in some regions, or for some customers. (Netz Deposition, pp. 153-154.)

⁶⁹ Dr. Netz also asserts that the alleged cartel agreed to restrict CRT output and production capacity, and that these efforts resulted in higher prices. (Netz Report, pp. 53-54) Dr. Netz presents no evidence that the alleged efforts to restrict CRT output or production capacity were uniformly effective or that class-wide impact from such efforts could be demonstrated with common proof.

⁷⁰ Dr. Netz does not identify any target prices that corresponded to any of the CRT sales reflected in the data produced by Hitachi.

⁷¹ Dr. Netz identified these “target prices” based on her review of documents related to meetings among Defendants. (Netz Report, pp. 61-62.)

⁷² Netz Report, pp. 63-64.

⁷³ Netz Report, p. 61 (“because target prices are above the competitive level, actual prices close to the cartel target price are proof that actual prices were above the competitive level”) and *Id.*, p. 33 (“prices paid by consumers were approximately equal to the cartel’s target prices.”)

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Such characteristics include opaque pricing (i.e., prices are not entirely transparent to suppliers)⁷⁴ and differing degrees of vertical integration across Defendants.⁷⁵ These features are found in the CRT industry during the relevant period.

82. Transparency of pricing matters for cartel stability because a cartel cannot succeed if cartel members can readily gain sales by cheating on the agreement and undercutting cartel prices without inviting retaliation. Cheating is more likely to be detected and deterred if each member of the alleged cartel were able to observe prices other cartel members charged their customers. If so, members would be able to detect whether cartel participants are, in fact, complying with the agreed-upon target prices. Conversely, if prices are opaque, then cartel members are unlikely to be able to detect cheating in a timely manner. Opaque pricing is especially likely to destabilize a cartel if the market experiences frequent changes in demand, cost and technology because it would be difficult for cartel members to separate price changes and shifts in market shares due to such changes in market conditions from price changes and shifts in market shares due to cheating.⁷⁶

83. As noted above, CRTs are extremely heterogeneous products, and CRT prices depend materially on a variety of CRT features. Prices were typically negotiated with individual customers, and it was not the industry practice to generate public list prices.⁷⁷ Moreover, as explained above in Section III.A of this report, the price differences between larger

⁷⁴ See, e.g., Church, J., & Ware, R. (2000). *Industrial Organization: A Strategic Approach*. McGraw-Hill. p. 340.

⁷⁵ See, e.g., Carlton, D.W., & Perloff, J. M. (1999). *Modern Industrial Organization*, 3rd edition. Addison-Wesley. p.138.

⁷⁶ Carlton, D.W., & Perloff, J. M. (1999). *Modern Industrial Organization*, 3rd edition. Addison-Wesley. p. 137; Motta, M. (2004). *Competition Policy: Theory and Practice*. Cambridge University Press, p. 150; Scherer, F.M. (1980). *Industrial Market Structure and Economic Performance*, 2nd edition. Houghton Mifflin. pp. 205-206; Church, J., & Ware, R. (2000). *Industrial Organization: A Strategic Approach*. McGraw-Hill. p. 341.

⁷⁷ Deposition of Jay Heinecke, July 31, 2012 (“Heinecke (TAEC) Deposition”), pp. 165-166. See also, Deposition of Yasuhiko Kawashima, July 18, 2012 (“Kawashima (HDL) Deposition”), p. 36; Deposition of L. Thomas Heiser, July 3, 2012 (“Heiser (HEDUS) Deposition”), p. 101.

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and smaller CPTs differed across manufacturers and over time. More generally, pricing complexity and diversity has been cited in testimony by executives from Defendant companies as a reason why manufacturers were unable to reliably assess prices of other CRT manufacturers.⁷⁸

84. Opaque and complex pricing are all the more likely to have eroded the effectiveness of the alleged cartel because there were major changes in the industry during the class period such as the growing competitive presence of LCD and plasma technologies.⁷⁹ Shifts in CRT market shares and price changes due to technology disruptions would be difficult to separate from share shifts due to cheating when prices are hard to know.

85. In addition to complex and opaque prices, the differing degrees of vertical integration by CRT suppliers also make it unlikely that the alleged cartel was uniformly and consistently effective in elevating prices. During the class period, several large CRT manufacturers were vertically integrated into manufacturing finished CRT products (i.e., TVs and monitors) while others were not. Specifically, Hitachi was vertically integrated throughout the class period, while Chunghwa, LPD, and SDI were not. Panasonic and Toshiba were each vertically integrated through 2003, at which point they formed a new entity called MTPD that acquired all of Panasonic's and Toshiba's former CRT manufacturing capacity,⁸⁰ with Panasonic retaining a controlling stake in MTPD.⁸¹

⁷⁸ See, for example, Lee (SDI) Deposition, p. 108. See also Deposition of Yoshiaki Uchiyama (TACP), August 1, 2012 ("Uchiyama (TACP) Deposition"), pp. 51-52.

⁷⁹ The shift from analog TV to digital TV in the U.S. was another notable change in the CRT marketplace during the class period. In particular, widescreen and high definition digital CPTs differed from analog CPTs and from CPTs used to display standard definition digital broadcasts. (United States International Trade Commission. (2000). *Color Picture Tubes from Canada, Japan, Korea, and Singapore, Investigations Nos. 731-TA-367-370 (Review), Determinations and Views of the Commission*. USITC Publication No 3291. pp. 21-22.)

⁸⁰ Toshiba's Himeji factory remained in operation for approximately a year after April 2003. During this year, the factory took orders from MTPD. (Kurosawa (Toshiba Corp.) Deposition, pp. 64-65.)

⁸¹ Panasonic initially owned 65% of MTPD and appointed a majority of the company's board members. (Kurosawa (Toshiba Corp.) Deposition, p. 154.) In 2007, Panasonic acquired

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Philips and LG were each vertically integrated through July 2001, at which point they each divested their entire CRT manufacturing businesses to LPD – a newly formed independent joint venture.

86. Economists have identified such asymmetries in vertical integration as a contributor to cartel instability.⁸² The price paid by a finished product manufacturer to an affiliated CRT manufacturer (the “transfer” price) is likely to be hard to detect by other firms, and the output incentives of a vertically integrated supplier of finished products are apt to differ significantly from those of non-integrated upstream and downstream producers.⁸³

87. Although the CRT industry contains features that likely eroded the effectiveness of the alleged cartel, it is also true that the CRT industry is characterized by other factors that economists have identified as facilitating collusion (for example, high entry barriers due to substantial sunk costs of setting up CRT plants⁸⁴). Thus, whether or not the CRT cartel alleged by the IPP class was uniformly effective in elevating prices of all (or most) products and customers during the twelve-year class period is ultimately an empirical question that needs to be resolved by examining the evidence on record.

(... footnote continued)

Toshiba’s entire 35% ownership stake. (Deposition of Takashi Nakano, July 13, 2012 (“Nakano (Panasonic, MTPD) Deposition”), p. 33.)

⁸² Carlton, D.W., & Perloff, J. M. (1999). *Modern Industrial Organization*, 3rd edition. Addison-Wesley. p.138.

⁸³ In particular, whereas unaffiliated finished-product manufacturers could be expected to use favorable pricing offered by one CRT manufacturer to try to convince other CRT manufacturers to offer even lower prices, an integrated finished-product manufacturer would not reveal that its upstream affiliate had cheated on the cartel agreement by lowering its transfer price.

⁸⁴ The construction of a CRT manufacturing plant required an extensive amount of time, and a high initial capital investment, and, once built, could not readily be used for uses other than CRT manufacturing. Some estimates state that a CRT facility required approximately one year to build and that construction costs ranged from \$70 to \$332 million. (Deposition of Nobuhiko Kobayashi, July 17, 2012 (“Kobayashi (Hitachi) Deposition”), p. 93; Tobinaga (Panasonic, MTPD) Deposition, pp. 146-147, 151-152; and United States International Trade Commission *in the Matter of: Color Picture Tube from Canada, Japan, Korea, and Singapore*, supra note 79, p. 18.

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Documentary Evidence Suggests that, Contrary to Dr. Netz's View, the Cartel Was, at a Minimum, Not Always Effective in Raising Prices across the Proposed Class.

88. In fact, the evidence strongly indicates that the alleged cartel was not uniformly effective in elevating prices. For example, many of the documents cited by Dr. Netz as evidence of Defendants meeting in order to set “target prices” refer to SDI (which was previously known as Samsung Display Devices (“SDD”)) undercutting prices of other Defendants. One instance of this is found in a May 1998 Chunghwa document cited by Dr. Netz about a meeting between Defendants. The document notes that “Mr. Moon [Orion] claimed that he believed that SDD had strong ambitions to expand M/S [market share], and that its major strategy is to ‘kill the competing makers.’ So he was suspicious about SDD's attitude toward holding prices.”⁸⁵ Consistent with this, SDI's share of global CRT sales increased sharply during portions of the class period. For example, between 2000 and 2005, SDI's share of worldwide CDTs sold increased from 25% to 42% and its share of CPTs sold increased from 18% to 22%. During that time, SDI's share of worldwide CDT revenue increased from 24% to 42% and its share of CPT revenue increased from 12% to 24%.⁸⁶ Shifting market shares among defendant CRT manufacturers is consistent with the view that the alleged cartel was not always stable or effective.⁸⁷

⁸⁵ Customer Contact Report, CHU00028952-CHU00028954, May 18, 1998. See also: Visitation Report, CHU00031113-CHU00031114 at CHU00031113, March 22, 2001; Customer Contact Report, CHU00028763-CHU00028767 at CHU00028763, February 24, 1997; CPT Sales Division Customer Contact Report, CHU00028599-CHU00028600 at CHU00028599, October 4, 1999; Visitation Report, CHU00028707-CHU00028710 at CHU00028707, July 18, 1997; Visitation Report, CHU00028713-CHU00028714, July 2, 1997; CDT Market Report, CHU00031249-CHU00031252 at CHU00031249, May 26, 2004; Visitation Report, CHU00036392-CHU00036393 at CHU00036392, January 18, 2002; Visitation Report, CHU00036394-CHU00036395 at CHU00036395, February 22, 2002.

⁸⁶ See Fuji Chimera reports cited in *supra* note 54.

⁸⁷ Economists have recognized that shifting shares among alleged cartel members is a symptom of an unstable cartel. See, e.g., Grout, P., & Sonderegger, S. (2005). Predicting Cartels. *Office of Fair Trading*; Harrington, J. E. (2007). Detecting Cartels. In P. Buccirosi (Eds.), *Advances in the Economics of Competition Law*. MIT Press.

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89. In addition to the conduct of SDI, qualitative evidence indicating that the cartel alleged by plaintiffs was less than uniformly effective can be found in the documents cited by Dr. Netz that relate to meetings between Defendants. Many of these documents indicate that participants found CRT pricing by other suppliers to be opaque and that Defendants often engaged in pricing conduct that deviated from what Dr. Netz refers to as “target prices” set by the putative cartel.⁸⁸

90. This documentary evidence of breakdowns in the alleged cartel is supported by data on actual CRT prices. Specifically, I have compared actual CRT prices charged by Defendants to the “target prices” that Dr. Netz alleges were set by the Defendants, and I find that actual prices frequently deviated from the alleged target prices.

91. For example, based on a Chunghwa document dated August 21, 1998, Dr. Netz infers that several Defendants attended the meeting referenced in this document and agreed to set a target price for 15-inch CDTs of \$60 that would be effective on August 1998.⁸⁹ This represents an increase of \$5 over the previous target price identified by Dr. Netz for the same product. If Defendants adhered to the alleged target prices when setting their actual sales prices, then their actual 15-inch CDT sales prices should have increased by an amount approximately similar to the alleged increase in the target price of \$5 during the relevant period. Conversely, if Defendants rarely adhered to the alleged target prices,

⁸⁸ See, e.g., CDT Market Report, CHU00031249-CHU00031252 at CHU00031249, May 26, 2004; Visitation Report, CHU00031142-CHU00031147 at CHU00031144, June 27, 2001; Visitation Report, CHU00030670-CHU00030674 at CHU00030673, October 1, 1998; Customer Contact Report, CHU00028763-CHU00028767 at CHU00028763, February 24, 1997. See also, CPT Sales Division Customer Contact Report, CHU00028599-CHU00028600 at CHU00028599, October 4, 1999; Visitation Report, CHU00028707-CHU00028710 at CHU00028707, July 18, 1997; Visitation Report, CHU00028713-CHU00028714, July 2, 1997; Visitation Report, CHU00030809-CHU00030814 at CHU00030809, July 23, 1999; Visitation Report, CHU00036394-CHU00036395 at CHU00036395, February 22, 2002; Report on the Results of the Industry Working Level Meeting on July 28, SDCRT-0086662-SDCRT-0086664 at SDCRT-0086662, July 29, 1999.

⁸⁹ Sales Department Customer Contact Report, August 21 1998, CHU00028385-6 at CHU00028386; Summarized Meeting Report, June 4 1998, CHU00028638.01E-.02E at CHU00028638.01E.

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then we should observe that changes in actual sales prices of 15-inch CDT models were inconsistent with changes in the target prices identified by Dr. Netz.

A Properly Specified Econometric Model Shows Little or No Connection between the Alleged Cartel Target Prices and Actual Prices.

92. To test this prediction of cartel effectiveness more broadly for the entire set of target prices identified by Dr. Netz, I have employed an econometric model to estimate how well month-to-month changes in actual prices of individual CRT models are predicted by changes in the corresponding target prices identified by Dr. Netz.^{90, 91} If Defendants closely adhered to the putative target prices, then changes in target prices should reliably predict changes in actual prices.⁹² In fact, the relevant data demonstrate that monthly

⁹⁰ Dr. Netz partitions CRT models by “group” and month. She defines a “group” as all CRT models that share the same manufacturer, application (CDT or CPT), size, and finish (bare or ITC). She then derives an average target price for each group-month based on her reading of the case record. (Netz Report, pp. 62-63.) For each model in a given group and each customer that purchased that model, I compared changes in the actual monthly prices charged to a given customer for a given model to changes in the alleged average target price for that group. For example, I compare the change in the actual monthly price paid by Sanyo (a customer) for a particular SEA 20-inch bare CPT model (A20GR00204) between January and February 2002 with the change in the average alleged target price for all SEA 20-inch bare CPT models during the same time period.

⁹¹ Because there may be no information on actual and/or target prices for a given month, my staff (under my instructions) looked for months in which both actual and target prices were observed and measured the average monthly actual and target price changes between such months. For example, if a model was sold to a given customer in January, February and March, but Dr. Netz only identifies a target price for the corresponding sub-group in January and March, then the actual and target price change for March would both be based on the average monthly price change between January and March.

⁹² I compare actual and target price *changes* rather than *levels* because target price levels are likely to be somewhat predictive of actual price levels even if the Defendants completely ignored the alleged target prices. For example, all else equal, both target and actual prices for a 30-inch CPT would presumably be higher than for a 14-inch CPT regardless of whether the Defendants ever adhered to the target prices. Thus, a comparison of actual and target price levels would grossly overstate the extent to which Defendants adhered to the alleged target prices. (Despite this fact, I show in Section III.B that even a comparison of actual price levels with target price levels shows a substantial fraction of CRT models had actual prices below target prices identified by Dr. Netz.) Comparing changes in actual and target prices mitigates this bias somewhat by

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changes in *target* prices are extremely poor predictors of changes in *actual* prices. Specifically, the R-squared statistic associated with my econometric model is 0.020. (See Exhibit 16.) The R-squared statistic is a standard metric ranging from 0 to 1 that measures the share of variation in the dependent variable in the model (in this case, changes in actual prices) that is explained by the independent variable(s) (changes in the alleged target prices).⁹³ In the context of this analysis, an R-squared statistic of 0.020 indicates that changes in the target prices identified by Dr. Netz explain only 2.0% of the variation in changes in the actual prices for corresponding CRTs. That is, the model demonstrates that changes in the alleged target prices are extremely poor predictors of changes in actual prices.^{94, 95}

93. Moreover, target price changes do an extremely poor job of predicting changes in actual prices even on average. Specifically, as noted in Exhibit 16, the estimated

(... footnote continued)

limiting the comparison to CRTs possessing similar characteristics, but it is still conservative to the extent that external factors such as changing production costs would likely influence both actual and target price changes in the same direction regardless of whether Defendants adhered to the alleged target prices or not.

⁹³ Gujarati, D. N. (1995). *Basic Econometrics*, 3rd edition. McGraw Hill. pp. 74-78.

⁹⁴ See Exhibit 16 for further details about the data used and model specification. I have conducted several robustness checks on this regression (described in the notes to Exhibit 16) and none of the variations yield an R-squared above 0.041, which implies that changes in target prices explain almost none of the changes in actual prices. I also conducted these analyses using CRT sales data only for Panasonic, MTPD, and SDI, which in some cases identify the shape of the CRT model (i.e., flat or curved). These analyses yield similar R-squares to those obtained when using the CRT sales data for all Defendants.

⁹⁵ In addition to testing how well month-to-month changes in actual prices of individual CRT models are predicted by changes in the corresponding target prices identified by Dr. Netz, I also tested how well the month-to-month changes in the average actual monthly prices paid by all customers for all models in a “group” (defined by Dr. Netz according to manufacturer, application, size, and finish) are predicted by changes in the alleged average target price for that group. The R-squared statistic associated with this econometric model is 0.034 (see Exhibit 16), which indicates that changes in the alleged average target price for a group are an extremely poor predictor of even the average change in actual prices for the models in that group. I have conducted several robustness checks on this regression (described in the notes to Exhibit 16) and none of the variations yield an R-squared above 0.081.

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coefficient on the target price change in my model is 0.084, which implies that a 5% increase in the target price identified by Dr. Netz is, on average, associated with only a 0.42% increase in the actual price during the same time period. Moreover, even this slight correlation does not imply causation (i.e., the change in actual price may not be due to the change in target price) since actual and target price changes are both likely to have been affected in the same direction by common market factors, generating some positive correlation between the two series, irrespective of whether Defendants ever adhered to the alleged target prices.

94. At her deposition, Dr. Netz agreed that she would expect a 5% change in the target price to be accompanied by a 5% change in the actual prices.⁹⁶ Clearly, this is not how prices actually responded to changes in the target price identified by her. Dr. Netz also testified that if actual and target prices were weakly related, it “could mean an ineffective cartel” as long as there were sufficient data for the analysis.⁹⁷ The very low R-squared and estimated coefficient on changes in the target price in the regression analysis described above demonstrate that there was an extremely weak relationship between changes in the target price and changes in the actual price. Moreover, these regression results are based on 7,231 observations (see Exhibit 16), which is a substantial sample that is several times larger than the samples that Dr. Netz relied upon in some of the regressions that she presents in her report.⁹⁸ I therefore conclude that the regression results demonstrate in a robust manner that the alleged cartel was far from uniformly effective (if at all), which is consistent with the documents on record and cited by Dr. Netz.

⁹⁶ Netz Deposition, p. 104 (**Q:** Would you expect based on your analysis there would a correlation between the target prices, if the target prices went down 5 percent, you would expect to see the actual prices go down 5 percent, something like that? Would you expect that based on your conclusions? **A:** I would expect that in an analysis that had sufficient data to look for such a pattern.)

⁹⁷ Netz Deposition, p. 105 (“lack of such a correlation could mean an ineffective cartel and it could mean a lack of data.”)

⁹⁸ See, e.g., Netz Report, Exhibits 19, 20, 23, and 34.

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95. The inability of changes in the target prices identified by Dr. Netz to predict changes in actual prices is further illustrated in Exhibit 17A. In this exhibit, the vertical axis represents monthly changes in *actual* sales prices of CRT models and the horizontal axis represents changes in the corresponding alleged *target* prices during the same time period.⁹⁹

96. If actual prices followed target prices closely, I would expect most observations to be located close to the 45-degree line (which is traced in the chart) indicating that an actual price change was equal to the alleged applicable target price change. However, although most of the data points are located in the lower left quadrant of the chart – consistent with the general downward trend in CRT prices over the course of the class period – the points are widely diffuse rather than clustered around the 45-degree line, which demonstrates that changes in actual prices for CRTs differed widely from changes in the alleged applicable target prices.

97. Part of the lack of uniform adherence to target prices identified by Dr. Netz was likely due to the fact that during the class period some Defendants were vertically integrated. As explained above, varying degrees of vertical integration among alleged cartel members can potentially erode the effectiveness of price cartels. The transfer price paid by an affiliated downstream finished-product manufacturer to an upstream CRT manufacturer is likely to be opaque to other CRT manufacturers, thus enabling integrated firms to deviate from cartel agreements with a relatively lower risk of detection and penalties for such cheating.

98. Consistent with this potential for cartel erosion, sales data on record indicate that prices of *transfer* CRT sales were even less likely to follow target prices identified by Dr. Netz than prices of *merchant* CRT sales. Specifically, I implemented the same econometric model as the one described above (i.e., where I assess how well month-to-

⁹⁹ More precisely, the vertical axis measures the change in the actual average sales price of a particular model of CRT sold to a particular customer by a particular manufacturer in a particular month. The horizontal axis represents the change in the target price associated with that model in the same time period.

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month changes in actual prices are predicted by target price changes), but now I do so separately for merchant and transfer CRT prices. Put differently, I inquire whether there is any difference between (a) the extent to which changes in *transfer* CRT prices are correlated with target price changes and (b) the extent to which changes in *merchant* CRT prices are correlated with target price changes.

99. If vertically integrated firms deviated more from the target prices identified by Dr. Netz when they sold CRTs to downstream affiliates than when they sold to unaffiliated customers, then we would observe a smaller correlation between transfer prices and target prices than between merchant prices and target prices. I find that this indeed is the case. Specifically, when I implement the model for merchant CRT sales, the model is associated with a very low R-squared of 0.024, implying that only 2.4% of the variation in actual price changes can be explained by target price changes (and even then correlation is not tantamount to causation). The estimated coefficient on the change in target price is 0.092, which is small – implying that a 5% increase in the target price is associated with only a 0.46% increase in the actual price – but statistically different from zero.¹⁰⁰ (See Exhibit 16.)

100. When I implement the same model for *transfer* CRT sales, the associated R-squared is an even lower 0.0001. The estimated coefficient on the change in target price is -0.005 – which implies that a 5% increase in the target price is associated with a 0.02% *decrease* in the actual price – and it is not statistically different from zero. The fact that changes in the alleged target prices are even worse predictors of changes in actual *transfer* CRT prices than for actual *merchant* CRT prices supports the hypothesis that the alleged target price-setting process was even less effective in the context of sales to downstream affiliates than in the context of sales to unaffiliated finished product manufacturers.

101. In sum, I conclude that the evidence indicates that the cartel was either ineffective or at least was not uniformly effective. Consequently, an individualized inquiry would be

¹⁰⁰ I test for significance using a two-tailed t-test at the 95% level.

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required to establish whether the cartel was effective at elevating prices for specific CRT models to specific customers at specific times.

102. In contrast, Dr. Netz's review of the same data leads her to conclude that the Defendants were successful in reaching target prices identified by her and that hence they were successful in elevating prices above but-for levels.¹⁰¹ I turn next to my assessment of these conclusions of Dr. Netz.

Dr. Netz's Target Price Analysis Is Biased towards Finding That Actual Prices Were at or above Target Price Levels as a Result of the Alleged Cartel.

103. As an initial matter, Dr. Netz's target price analysis is biased in the sense that her test would tend mistakenly to indicate that actual sales prices were at or above target prices regardless of whether manufacturers set their actual prices below target prices. In order to see why this is the case, note that Dr. Netz compares the target price for a group of CRTs that share certain characteristics (e.g., Panasonic's 17-inch bare CPTs) with the average actual price charged for CRTs possessing those characteristics. However, she acknowledges that, for a given group of CRTs, the target prices were often set only with respect to relatively basic models within the group (e.g., only for Panasonic's relatively basic 17-inch bare CPT models).¹⁰²

104. Dr. Netz's methodology thus leads her to compare a *target* price for more basic models in a group with an average *actual* price that includes both basic and premium CRTs in that group. Because premium CRTs are likely to be priced higher than basic models, this is not an apples-to-apples comparison. Instead, it biases her average actual prices up relative to the alleged target price. As a result, even if manufacturers always set actual prices below target prices, her test could indicate that actual sales prices were close to or above target prices. Her test is therefore biased toward finding a successful cartel

¹⁰¹ Netz Report, pp. 34, 61, 64.

¹⁰² Netz Report, p. 63.

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simply by its construction, regardless of the extent of the alleged cartel's actual effectiveness.

Dr. Netz's Target Price Analysis Inherently Masks Differences between Actual and Target Prices.

105. Moreover, the relevant question for class certification is not whether the cartel was effective in elevating prices on *average*. Instead, the pertinent issue is whether the alleged cartel succeeded in elevating prices to all or most members of the class in the U.S. during most of the relevant period for most products and whether that widespread impact across direct purchasers can be established using common evidence. Dr. Netz's target price analysis does not and cannot establish the existence of such widespread injury due to her focus on average prices.

106. Specifically, Dr. Netz presents an analysis in which she determines the average actual price and average putative target price (averaged across all CRT models and all customers) in a given period and then compares the average actual price to the average target price.¹⁰³ By focusing on *average* prices across all CRT models, her analysis masks considerable differences between the actual and target prices for individual CRT models.¹⁰⁴ Asked at her deposition about this possibility, Dr. Netz testified that if half of the transactions in a given month were priced 25% below the target price and the other half were priced 25% above the target price (thus yielding an average actual price that equals the average target price across all transactions), she would consider the Defendants to be charging prices equal to the target price.¹⁰⁵ Similarly, she testified, "My

¹⁰³ Netz Report, Exhibit 14.

¹⁰⁴ Exhibits 15-17 of Dr. Netz's Report compare model/customer-level prices with target prices, but these analyses aggregate across the entire class period, which masks the fact that in some periods actual prices are far more likely to be materially different from target prices than in other periods.

¹⁰⁵ Netz Deposition, p. 158.

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analysis was whether there was impact across the board, not tube size by tube size.”¹⁰⁶

This framework appears contrary to the fundamental goal of trying to determine whether class-wide impact can be demonstrated using common proof.¹⁰⁷

107. Instead of comparing *average* prices across all CRT models, I compared the actual price at which each *individual* CRT model was sold to each customer in a given month to the putative target price that Dr. Netz identified as applicable to that model, customer, and month. I find that in 52 of the 55 months in which Dr. Netz identified alleged target prices, at least 25% of actual prices were below the applicable alleged target price.

108. This is illustrated in Exhibit 18. The box plots in this chart show the range of actual CRT prices in a given month in comparison with the alleged target prices identified by Dr. Netz. In particular, they show how Dr. Netz’s approach focused on averaging CRT prices masks the extent to which CRT prices deviated from target prices. For example, in October 1999, the difference between the average actual and average target prices across all models was roughly zero. However, 57% of CRT sales volume in that month was priced below the applicable alleged target price, 36% was priced more than 5% below the applicable target price, and 14% was priced more than 10% below the applicable alleged target price. Exhibit 18 shows that in roughly half of the months in Dr. Netz’s analysis, a *majority* of CRT sales volume for which Dr. Netz identified alleged target prices was priced *below* the applicable alleged target price. Similarly, across all

¹⁰⁶ Netz Deposition, p. 205. Dr. Netz also testified that the cartel was not necessarily trying to increase prices for all CRTs. Netz Deposition, pp. 200-201 (“**Q:** In this case, was it profit maximizing for the cartel to try to affect 100 percent of the prices with a target price or some smaller percentage? Do you have an opinion on that? **A:** No, I don't. As I've said several times, I believe the goal was to maximize profits, not to maximize the number of prices they affected.”)

¹⁰⁷ It is also noteworthy that Dr. Netz’s alleged target price analysis almost completely ignored CDTs. Specifically, she compared actual prices to alleged target prices that she identified for CDTs in only seven separate months of a more than twelve-year class period. (The months are: November 1996, April and December 1997, February 2002, July 2003, April 2004, and January 2005.) Additionally, her analysis covers only some of the CDTs sold in each of those seven months.

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months, more than half of the CRT sales volume for which Dr. Netz identified an alleged target price was priced below that target price.

Dr. Netz's Failure to Perform any Analysis of But-For Prices, at a Minimum, Leaves Open the Possibility that a Substantial Number of Class Members Were Not Injured.

109. It is important to recognize that even if one were to accept Dr. Netz's assertion that all target prices were above the competitive level, because Dr. Netz does not estimate a but-for (i.e., competitive) price, she provides no information that would allow a fact-finder to determine whether actual sales prices that are below the alleged target price exceed the but-for price. Because such sales represent a majority of the CRT sales volume that can be compared to the target prices that Dr. Netz identified, it raises the possibility that (at least) a substantial share of CRT prices were not impacted by the alleged cartel (even for the subset of time periods and products for which an alleged target price has been identified).

110. As a robustness check on my comparison of actual and target prices, I consider whether the substantial share of actual prices that fell below the applicable alleged target price could result from Dr. Netz being unable to identify precisely the target price applicable to a given model in a particular month. With the information available to her, Dr. Netz is only able to identify a range of target prices that may be applicable to a given model in a particular month. However, even after accounting for this lack of precision in target prices, actual prices frequently deviated from target prices. In particular, I find that 30% of CRT sales volume was priced more than 5% below the lowest potentially applicable target price,¹⁰⁸ and another 23% was priced more than 5% above the highest

¹⁰⁸ In most cases there is insufficient information available with which to determine the full range of characteristics of a particular CRT model sold by the Defendants. As such, it is generally not possible to determine with certainty whether a particular alleged target price (pertinent to models with a specific set of characteristics) is applicable to a given CRT model. I refer to an alleged target price as "potentially applicable" to a CRT model if the target price applies to the set of identifiable product characteristics of that model.

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potentially applicable target price during the relevant period.¹⁰⁹ Consequently, only 48% of transactions were within 5% of the range of potentially applicable target prices. (See Exhibit 19.)

111. Even the 48% of transactions that were priced within 5% of the range of potentially applicable target prices identified by Dr. Netz do not necessarily represent adherence by Defendants to the putative target prices. In fact, nothing in Dr. Netz's analyses permits the fact-finder to determine whether a particular transaction price was consistent with the target price allegedly set by the alleged cartel. There are two reasons for this.

112. First, the documents Dr. Netz relies on to calculate target prices typically do not contain sufficient information to identify the target price set by the alleged cartel across a full range of product characteristics (e.g., they often do not identify target prices separately for low and high frequency CRTs), much less for a particular CRT. This implies either that the alleged cartel members only set average prices for categories of products, or that they implicitly or explicitly agreed on target prices along a wider range of product characteristics than the characteristics reflected in the documents that Dr. Netz relies upon. If the cartel only set average prices for categories of products, Dr. Netz provides no explanation of how compliance with such a scheme could be monitored without detailed information about the price and quantity for each transaction. Even if the cartel implicitly or explicitly agreed on target prices along a wider range of product characteristics than reflected in the documents that Dr. Netz relies upon, Dr. Netz's analyses provide no indication as to whether the Defendants adhered to those prices.

113. Second, there is insufficient information with which to identify in the sales data many of the product characteristics for each CRT model sold by the Defendants. As a result, even if target prices were always specified across all the products characteristics that were material to pricing (and Dr. Netz provides no support for this), it would be

¹⁰⁹ Below-target pricing may have been at levels consistent with but-for price levels, but since Dr. Netz does not provide any sense of what but-for price levels would have been, there is no way to tell which or how many customers were harmed.

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impossible to attribute a particular target price to a particular CRT model, and therefore impossible to know whether that model was sold at a price at, above, or below the target price or by how much.

114. Finally, if Dr. Netz is correct in her view that Defendants mostly adhered to the alleged target prices she identified, then periodic changes in those alleged target prices should accurately predict changes in actual CRT prices. As I have explained above, data on actual sales prices strongly contradict this implication. In fact, changes in the alleged target prices are extremely poor predictors of actual changes in CRT prices by Defendants.

IV. Class-Wide Impact on Indirect Purchasers Cannot Be Established using Common Evidence

Differentiated Pass-Through Rates along Complex Distribution Chains.

115. Even assuming *arguendo* that the alleged cartel had a uniform impact on the prices paid by direct purchasers of most or all CRTs during the class period, it likely would have had a uniform impact on the prices paid by end users only if the increase in CRT prices flowed through the various stages of the manufacturing and distribution chain to end users in a uniform manner. However, if pass-through rates differed across various stages of the distribution chain, various entities within the same stage of the distribution chain, and/or sales by the same entity, then end users would not have been impacted in a uniform fashion. Moreover, if some of the various entities periodically did not pass-through cost changes for some products and customers, then some (and perhaps many) end users may not have been impacted at all. As a result, individualized inquiries specific to the distribution channel, product, and time would have to be made in order to assess impact.

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116. Dr. Netz contends that manufacturers and re-sellers passed through the putatively elevated cost of CRTs in a uniform and common manner, passing through at least 100% of the elevated cost of CRTs to end-users.¹¹⁰

117. Industry characteristics strongly indicate that such uniform pass-through is highly unlikely. As an initial matter, there is no dispute in this case that the proposed IPP class bought thousands of highly differentiated models of CRT televisions and computer monitors, with components that included thousands of different CRTs, from hundreds of different retailers, during a period of more than twelve years. Data produced by re-sellers¹¹¹ in the instant matter indicate that re-sellers often charged different prices to different customers for the same product based on the store, date of sale, region, and promotions in place.

Both Price Levels and Changes in Price Levels Were Highly Differentiated

118. For example, Exhibit 20 illustrates the prices at which a retailer (PC Connection) and a distributor (Ingram Micro) sold a particular Lenovo 15-inch CRT monitor (product #633147N) from late-2001 to mid-2006. Each “dot” in this chart represents the price for a specific sales transaction of this Lenovo monitor and the month in which this transaction occurred. The chart shows that PC Connection and Ingram Micro sold this Lenovo monitor to end users for very different prices over time and for different prices even within the same month. For example, in April 2002, Ingram Micro sold this monitor for prices that ranged mostly between \$123 and \$160. PC Connection’s prices for the same monitor ranged from \$135 and \$150 in April 2002. Average prices drifted down over time before increasing again. PC Connection’s and Ingram Micro’s price-cost ratios also varied substantially across sales made in the same month and across months. As seen in

¹¹⁰ Netz Report, p. 104.

¹¹¹ “Re-sellers” include not just retailers such as Costco, Best Buy, and PC Connection (an internet retailer) but also distributors such as Ingram Micro that sold primarily to business customers.

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Exhibit 21 and Exhibit 22, their price-cost ratios ranged from less than 0.4 (i.e., prices below cost) to more than 1.3.

119. Not only were the price *levels* of CRT finished products differentiated across retailers, products and time, *changes* in prices of CRT finished products were also highly differentiated. The prices of most finished CRT products, like the prices of CRTs themselves, changed substantially and very differently over the twelve-year class period (although generally trending down). For example, as explained above, in 130 of the 152 months in the class period, at least 20% of retail CRT finished product prices declined (month-over-month) by 5% or more while at least 20% of TV and monitor prices were flat.¹¹² These disparate pricing patterns for CRT finished products make it unlikely that pass-through rates were uniform across all CRT finished products, retailers, customers, and time, which in turn makes it highly problematic to prove that all indirect purchasers paid an overcharge for a CRT television or monitor using class-wide rather than individualized evidence.

The CRT Distribution Channels Were Long and Complex

120. Compounding the challenge, distribution chains for CRTs were diverse and could be long and complex. Many CRTs could be sold up to five times (including when embedded in a finished product) before reaching the end user.¹¹³ For example, during the class period TDD (a U.S.-based, Toshiba-affiliated manufacturer of CRTs) sold CRTs to TAEC (Toshiba's U.S. distribution arm of CRTs). TAEC then re-sold CRTs to TACP (a

¹¹² These estimates are based on sales prices of all CRT finished products sold at the retailers identified in Exhibit 3B.

¹¹³ It is important to note that because a CRT can be sold numerous times, even if some portion of a cost change is passed-through at each stage of the distribution chain, the total pass-through from the original CRT sale to the end user may be negligible. For example, if cost changes are passed-through at a rate of 30% at each level of the distribution chain for a CRT that passes through four levels, the total pass-through rate would be $30\% \times 30\% \times 30\% \times 30\% = 0.81\%$, which is so small that concluding there was pass-through for any given transaction would be purely speculative, and detecting pass-through to end users would be unreliable.

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Toshiba-affiliated manufacturer of TVs).¹¹⁴ TACP manufactured TVs and sold them to: (a) large brick-and-mortar retailers like Costco; (b) distributors who then re-sold to smaller retailers; and (c) internet retailers such as PC Connection, among others. Most of these intermediaries, in turn, re-sold the TVs to end users. The complexity of distribution channels is illustrated in Exhibit 23.

121. Additionally, as discussed above, the distribution chains include various types of re-sellers (bricks-and-mortar retailers, internet retailers, commercial distributors, etc.) with varying business models. Exhibit 1B shows that resellers sold CRT finished products at wide ranges of price points. It also shows that the range of CRT finished product prices varied widely across different retailers. Exhibit 2B illustrates that there was substantial variation in the magnitude and direction of CRT finished product price changes in a given month for a given retailer. It also illustrates that the extent of such variation differed widely across retailers. For example, month-to-month changes in retail prices of individual TVs and monitors at Costco were very small and contrast sharply with the substantial variation in the magnitude and direction of retail price changes in a given month at Best Buy. Given the substantial differences between the various resellers in the CRT distribution chain, one would expect pass-through rates to be far from uniform across CRTs and finished products, retailers, customers, and time.

Dr. Netz's Flawed Pass-Through Regression Model Only Estimates Average Pass-Through Rates

122. Despite these industry features, Dr. Netz concludes, based on a regression model of pricing, that pass-through rates were uniformly 100% or higher among the varied intermediaries in the CRT distribution chain examined by her. As I explain below, there are several substantial flaws in Dr. Netz's regression model, and correcting (or mitigating) these flaws leads to a very different conclusion. Even setting aside these flaws in her regression model, Dr. Netz's pass-through analysis is fundamentally inapposite for

¹¹⁴ Based on review of "TAEC Sales data, TAEC-CRT-00016371.xls, TAEC-CRT-00016373.xls."

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assessment of the proposed class since she generates estimates of only the *average* pass-through rate for each finished product manufacturer or reseller in the distribution chain – averaged across time periods, products and transactions. Dr. Netz assumes without discussion or support that the average pass-through rate that she estimates applies to all time periods, products and transactions. However, market conditions changed over time and different segments of CRTs were subject to different market conditions, as explained above. One would expect these significant variations in market conditions to have led to significantly heterogeneous pass-through rates. Indeed, as noted in pleadings by several retailers, pass-through rates may sometimes have been zero.¹¹⁵

123. I have examined the distribution of pass-through rates for the entities analyzed by Dr. Netz, and I find that each of them responded to cost shocks in widely divergent ways, depending on the time period and product, so that the rate at which a particular entity passed-through CRT or finished product cost changes was far from uniform across products and across time. Moreover, for some entities, the pass-through rates were not positive in a significant number of instances.

124. For example, I examined the responses by Zones, an internet retailer, to changes in its cost of procuring various CRT monitors in each month between 2000 and 2008.¹¹⁶ If Dr. Netz's estimate of Zones' average pass-through rate (104%) were correct, and if this pass-through rate applied uniformly to all CRT monitors that Zones sold throughout

¹¹⁵ Best Buy Co. Inc. et al. Complaint, ¶92, 14 November 2011; see also Trustee of the Circuit City Stores, Inc. Liquidating Trust Complaint, ¶217, 14 November 2011; Compucom Systems, Inc. et al. Complaint, ¶88, 14 November 2011; Costco Wholesale Corporation Complaint, ¶184, 14 November 2011; Electrograph Systems, Inc. et al. Complaint, ¶98, 10 March 2011; Interbond Corporation of America Complaint, ¶86, 14 November 2011; Office Depot, Inc. Complaint, ¶87, 14 November 2011; P.C. Richard & Son Long Island Corporation et al. Complaint, ¶92, 14 November 2011; Schultze Agency Services, LLC Complaint, ¶90, 14 November 2011; Target Corp. et al. Complaint, ¶106, 6 January 2012.

¹¹⁶ Although the class period ends in November 2007, Dr. Netz's analysis of Zones' pass-through rate uses data between 2000 and 2008. I use the same data as Dr. Netz for Zones and other entities listed in Exhibit 24 since my purpose here is to demonstrate that Dr. Netz's regression estimates of pass-through rates mask a great deal of heterogeneity across entities along the distribution chain and across sales within an entity.

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the class period, then we would observe that the actual pass-through rate were close to 104% in all or most instances in which Zones' cost of procuring a CRT monitor changed materially.¹¹⁷ Yet in 43% of the instances in which Zones's average cost of procuring a CRT monitor model changed by at least 5% from one month to the next,¹¹⁸ Zones passed-through less than 50% of the cost change. Moreover, in 30% of these instances, Zones either did not change its monthly average retail sales price of that monitor model or changed its price in the opposite direction during the same time period.¹¹⁹ Thus, the 104% monitor pass-through rate that Dr. Netz reports for Zones (which overstates even the *average* pass-through rate for reasons described below) is an especially poor prediction of how much of any specific cost change Zones actually passed-through (if at all). As illustrated in Exhibit 24A, many entities analyzed by Dr. Netz had passed-through cost changes at rates that were often one half or less, and frequently zero or negative, and there is also substantial heterogeneity across the retailers and manufacturers.^{120, 121}

¹¹⁷ Other changes in market conditions may prevent Zones from passing on a cost increase. However, Dr. Netz does not control for changes in market conditions in her analysis. As I explain below, this omission causes her to over-state the average pass-through rate at Zones and other entities that she examines. Moreover, if the extent to which Zones passed-through a change in its cost of procuring a particular monitor in a particular month depended on the specific market conditions around that time for that product, then that fact further serves to underline the need for individualized inquiries of pass-through rates.

¹¹⁸ To avoid conflating the effects of multiple cost changes that occur in a short period of time, I consider only instances in which Zones' (weighted average) procurement cost for a model changed by at least 5% and its procurement cost for that model did not change by a similar magnitude in the previous or following month.

¹¹⁹ In her pass-through regressions, Dr. Netz assumes that retail sales prices of finished products reflect contemporaneous wholesale costs, i.e., there is no lag in the reaction of prices to cost. I maintain the same assumption in Exhibit 24A. However, relaxing the assumption and allowing prices to respond with a lag of one month does not alter qualitative results.

¹²⁰ It is possible that some of the heterogeneity in pass-through rates stems from limitations in available data (e.g., lack of retailer rebate information). However, even if this is the case, it would imply only that it is impossible to determine from the available data whether pass-through rates are highly variable, or whether the available data are insufficient to accurately estimate pass-through rates for particular manufacturers/resellers, products, customers, and time, or both.

(footnote continued ...)

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125. Another example of de-linked cost and price decisions is found in a 30-inch Toshiba TV that was first sold by TACP in July 2003.¹²² TACP's per-unit manufacturing cost for this TV model remained stable after July 2003 until it increased by 7% in October 2003 and then remained elevated (i.e., above its initial manufacturing cost) through November 2005, when sales of this particular model ended. TACP's sales price for this model declined by 0.7% in October 2003 despite the contemporaneous 7% cost increase. Moreover, during the twenty months from October 2003 through November 2005 in which TACP made sales of this model, TACP's sales price for this TV either declined or remained unchanged in all but two months (when its price increased by just 1.2% and by 0.3%). Overall, TACP's price for this model declined sharply during most of the model's lifespan. Clearly, the price that TACP charged for this product was not tightly linked to its recorded manufacturing cost. An investigation of the particular marketplace conditions that determined the pricing of this specific product would be necessary to determine whether any alleged overcharge due to the putative cartel would have been passed through to customers.

(... footnote continued)

This, in turn, would imply that the impact of the alleged cartel on a particular member of the proposed class cannot be determined using common evidence of the sort proposed by Dr. Netz (i.e., a regression model implemented using data produced by retailers and manufacturers).

¹²¹ Since the allegation is that the alleged cartel elevated prices in the marketplace, it is worth noting that pass-through rates were generally lower and more often zero or negative for cost increases than for cost decreases in the context of the analysis presented in Exhibit 24A. Seven entities listed in Exhibit 24A had at least 15 instances of cost increases during the data period, and for all of them the incidence of zero or negative actual pass-through rates was higher for cost increases than for cost decreases. (The entities are: Amazon (monitors), Ingram Micro (monitors), PC Connection (monitors), PC Mall (monitors), Tatung (monitors), Tech Data (monitors), Zones (monitors).)

¹²² TACP data are in TACPCRT00000045 – TACPCRT00000064. The specific 30-inch TV is designated by the model number 30HF83 in TACP data, and the same data indicate that the particular TV was a flat screen TV and not a VCR combination TV, nor a HDTV. No other characteristics are provided in TACP data for this model.

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126. As the results presented above prove, the average pass-through rates estimated by Dr. Netz mask considerable variation in pass-through rates for a given re-seller or finished product manufacturer – including many cases in which cost changes do not appear to have been passed-through at all. As a result, it would be impossible to determine whether any alleged CRT overcharges were passed-through to a particular member of the proposed indirect purchaser class without an individualized inquiry into the pass-through rate, if any, for that particular product at each link in the distribution chain.

Dr. Netz's Flawed Pass-Through Regression Model Fails to Control for Differences across Products and Market Changes.

127. Even as an estimate of the *average* pass-through rate at each re-seller, Dr. Netz's approach is flawed because she does not properly control for differences across CRT finished products and for changes in market conditions over time (factors that she acknowledges are important to address).¹²³ Once these flaws in her approach are addressed, the data reveal that (a) Dr. Netz over-estimates average pass-through rates, and (b) average pass-through rates significantly differed across manufacturers and resellers and across CRT finished products. I explain these issues in the rest of this section.

128. The first flaw in Dr. Netz's approach is that she does not properly control for differences across products. Dr. Netz' estimates of average pass-through rates rely in large part on comparing the prices and costs of different CRT finished products. For example, Dr. Netz's analysis of Amazon's pass-through rate for monitors includes two 19-inch monitors with the CTX brand, both of which had a resolution of 1600 x 1200,

¹²³ In order to estimate pass-through rates, Dr. Netz relies on a regression where the dependent variable is the sales price of a particular CRT finished product at a particular point in time and the independent variables are: a small group of finished product characteristics and the cost of that product.

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and which I refer to as CTX Expensive and CTX Cheap for convenience.¹²⁴ In February 2003, Amazon paid an average of \$278 for CTX Expensive and sold it to a particular customer for \$294.¹²⁵ In the same month, it paid an average of \$159 for CTX Cheap and sold it for an average of \$167.

129. The logic of Dr. Netz's pass-through regression is such that she would compare CTX Expensive and CTX Cheap and note that (a) CTX Expensive cost Amazon \$119 more than CTX Cheap and (b) Amazon sold CTX Expensive for \$127 more than the price of CTX Cheap. Based on this, Dr. Netz's approach would estimate a pass-through rate of roughly 107% for these products (\$127 divided by \$119).

130. However, the fact that Amazon charges higher prices for monitors that cost them more to procure says nothing about how it would respond to the alleged overcharge on a particular product. Dr. Netz's approach potentially over-estimates pass-through rates because she attributes the entire difference in the retail prices of the two CTX monitors in this example to the difference in their costs. However, it may be that the CTX Expensive monitor was priced higher in part because it had features (e.g., differences in dot pitch, maximum resolution, video input bandwidth¹²⁶) for which customers were willing to pay more (and no information on them is available in the sales data produced by Amazon).¹²⁷ As a result, the price differential for these two models may result from differences in

¹²⁴ CTX Expensive and CTX Cheap refer to Amazon part # B00006B6VN and #B00006B6VP, respectively. The information regarding their resolutions came from the Amazon Sales Data produced in this matter.

¹²⁵ Amazon also sold this model to another customer in February 2003 for \$309. The description of the flaws in Dr. Netz's pass-through regressions would apply equally if this transaction were used in the example.

¹²⁶ For information on these two monitors and their features, see <http://jcvinc.com/ctxpl9crt19i-.html> and http://www.superwarehouse.com/CTX_PR960FL_19_CRT_Monitor/PR960FL/p/-14753.

¹²⁷ Amazon sales data produced in this litigation do not provide information on monitor characteristics other than brand, size, and resolution. As such, the factors that differentiated the two monitors in this example are unobserved in Amazon's produced data. Nonetheless, the fact that customers were willing to pay a higher price for the CTX Expensive monitor is evidence that it had desirable features that the CTX Cheap monitor did not have.

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customers' willingness to pay for each model, not just differences in Amazon's procurement cost. In such cases, Dr. Netz's regression analysis would over-estimate average pass-through rates because it assumes that all price differences between products that share a few characteristics are entirely attributable to the products' cost differences.¹²⁸

131. Not only does Dr. Netz compare very different products, but she also compares CRT finished products at very different points in time. This leads to a second problem with Dr. Netz's approach to pass-through. For example, her analysis compares the prices of 27-inch CRT TVs in 1996 with their prices in 2007. CRT TV prices typically declined during the class period. Some of this decline was likely due to the fact that wholesale prices and manufacturing costs of CRT TVs declined, and such cost declines were passed on in the resale prices of the TVs. However, it is likely that some of the decline in retail prices of CRT TVs was also due to changes in consumer preferences in favor of newly emergent LCD TVs (as explained earlier), whose prices dropped considerably during the class period.¹²⁹ Additionally, the decline in retail demand for CRT TVs and monitors

¹²⁸ In principle, it appears Dr. Netz agrees that it is important to control for differences in characteristics across CRT finished-product models: "...when observing multiple products or a product sold at multiple outlets at a single point in time, there may be differences across products and/or across outlets that may have an impact on price as well as on cost." (Netz Report, p. 116) The solution she suggests is to "include variables to control for different product characteristics to the extent possible given the data." (Netz Report, p. 115) However, her solution will not be sufficient unless the identifiable product characteristics are able to perfectly explain differences in demand between products. This is surely not the case for the data on which Dr. Netz relies because they contain only limited information on product characteristics. For example, Amazon's monitor data do not include information on the screen shape (flat or curved), weight, dot pitch, maximum resolution, and video input bandwidth among many other features that may be relevant for demand and pricing.

¹²⁹ "As LCD prices fall CRTs will lose share;" "CRTs are boxy, heavy, thick and consume more power than competing technologies;" "Consumers' belief that digital/HDTVs require non-CRT solution and that the CRT forma factory is old fashioned." (TAEC00006084. Shulklapper, Andrew. DisplaySearch HDTV Forum 2004: Accelerating the HDTV Transition, August 24-26, p.11. See also pp. 4-17.)

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likely would have exerted pressure on upstream suppliers to reduce the wholesale prices they charged for CRTs and CRT finished products.¹³⁰

132. A proper estimate of pass-through rates would separate these two sources of pricing pressure (i.e., cost reduction and demand reduction) on CRT TVs. Conflating and aggregating the two would exaggerate pass-through rates and attribute the entire decrease in retail prices to the decline in cost when, in fact, the decline in price was at least partly due to changes in consumer preferences and LCD competition. Although Dr. Netz acknowledges this issue and the need to address it,¹³¹ she does not, in fact, attempt to control for market trends in her pass-through estimates.¹³²

¹³⁰ See, e.g., testimony of representatives of various Panasonic entities. Panasonic Audio Visual Company America (“PAVCA”) (a Panasonic subsidiary located in North America that manufactured TVs and monitors primarily for sale in North America) sold the vast majority of the TVs it manufactured to Panasonic North America (“PNA”), which then re-sold those TVs to retailers. (Kimura (PAVCA) Deposition, pp. 39-40, 42.) Testimony from Panasonic employees indicates that PNA set certain sales targets for CRT TVs in the U.S. during the relevant period and then negotiated the prices that PNA paid to PAVCA (the manufacturing division) for TVs in order to achieve those targets. (Deposition of Edwin Wolff, July 18, 2012 (“Wolff (PNA) Deposition”), pp. 18, 29-30, 59-60.) Masahiro Kimura testified that that PNA’s market price was the foundation of PAVCA’s pricing to PNA and that PAVCA’s ex-factory price was based on the price requested by PNA rather than its material costs. (Kimura (PAVCA) Deposition, pp. 42-43, 49-50.) This type of approach to setting PAVCA’s sales prices implies that upstream prices of their TVs were at least partly driven by downstream prices. Hence, the decline in downstream prices in response to declining demand for CRT TVs would have exerted downward pressure on upstream wholesale prices.

¹³¹ Netz Report, p. 116. (“when observing changes in prices and costs over time, not only is the cost changing, but other factors are changing too, such as the quality of the product relative to other available products” and “if one uses time series data, one can include variables to control for changes that take place over time.”)

¹³² The only exception is in the pass-through regression for Tatung, a monitor manufacturer, in which she includes a dummy variable for each year as a control for market conditions that changed over time. Dr. Netz also includes dummy variables for each calendar month in her transactions-level pass-through regressions for Walmart and Sam’s Club, but such dummy variables would at best control for seasonal market fluctuations and not changes in market conditions over a longer time horizon. (Netz Report, Exhibit 35.) Dr. Netz does not explain why her model specifications for Tatung, Walmart, and Sam’s Club differ from the other entities that she examines.

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A Properly Specified Pass-Through Regression Model Demonstrates That Pass-Through Rates Vary and Are Often below 100%.

133. In sum, Dr. Netz's approach has at least the potential to over-estimate pass-through rates because she compares widely different products and because she does not account for trend changes in market conditions. I mitigate both these deficiencies and re-estimate pass-through rates. Specifically, I fully control for differences between products,¹³³ and I also control for the decline in the prices of products over time due to declining industry demand and the general tendency of suppliers to reduce the price of older models.¹³⁴

134. When additional variables to control for differences in product characteristics across CRT finished product models and differences in market conditions over time are added to Dr. Netz's pass-through regressions, the resulting estimates of average pass-through rates are often below 100% and reveal substantial heterogeneity in pass-through rates across manufacturers and re-sellers of CRT finished products.

135. Exhibit 25A presents the estimated average pass-through rate for each manufacturer and re-seller in my analysis.¹³⁵ Evident in this table is the fact that the

¹³³ A standard econometrics methodology used when unobserved differences between products need to be controlled for in a "panel data" setting (i.e., in a dataset that has multiple products for multiple periods) is to include in the regression fixed effects (or "dummy variables") for individual products, as I do in my pass-through regressions (described in more detail in the Appendix). This does not require any additional data and ensures that demand differences between products are appropriately controlled for. See, Davis, P., & Garcés, E. (2010). *Quantitative Techniques for Competition and Antitrust Analysis*. Princeton University Press. Section 2.2.3.1.

¹³⁴ I include a time trend variable in my pass-through regressions (described in more detail in the Appendix). In her hedonic price analyses, Dr. Netz includes similar time trend variables in order to control for conditions that change over time. (Netz Report, pp. 68-9, footnote 222.) Simply controlling for time trends in Dr. Netz's regressions and making no other change to Dr. Netz's specification (and hence not fully controlling for product characteristics) produces pass-through estimates that are qualitatively similar to those in Exhibit 25A.

¹³⁵ Exhibit 25A lists 21 entities: four finished CRT product manufacturers (Funai, Gateway, TACP, and Tatung), six brick-and mortar retailers (Circuit City, Costco, Fry's, Office Max, Sam's Club, and Walmart), six on-line retailers (Amazon, Buy.com, CDW, PC Connection, PC

(footnote continued ...)

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average pass-through rate differs considerably across individual retailers and manufacturers. As further illustrated in Exhibit 26, 12 of the 33 average pass-through rates (36%) were at or below 80% and all but one of these were statistically significantly different from 1.¹³⁶ The differences in the estimated average pass-through rates across manufacturers and re-sellers likely reflect differences in their business models and strategies.

136. Uniformity in pass-through rates is even less likely if individual resellers/manufacturers do not uniformly pass-through cost increases to all (or most) of their customers, for all (or most) products and at all (or most) times. The regression results presented in Exhibit 25A only describe *average* pass-through rates for individual entities. As noted earlier, regressions such as these can mask considerable heterogeneity in pass-through decisions made by resellers and manufacturers.

137. An example of this heterogeneity can be seen in the context of Amazon in Exhibit 27A. The exhibit compares the average pass-through rates of 36 CRT monitor models at Amazon.¹³⁷ Although the regression estimates that the average pass-through rate across all CRT monitors sold by Amazon was 0.88, the average pass-through rates for the individual monitor models examined in Exhibit 27A varied widely, ranging from almost

(... footnote continued)

Mall, and Zones), and five distributors (Arrow Electronics, BenQ America, Ingram Micro, TAIS, and Tech Data). The entities I include in my pass-through analysis are nearly the same ones that were included in Dr. Netz's analysis, which makes it possible to compare the pass-through rates estimated by our respective approaches. I include Circuit City in my analysis, which she did not. However, due to data limitations, I exclude from my analysis several entities such as Dell whose pass-through rates Dr. Netz estimated. These entities and their data limitations are described in the Appendix.

¹³⁶ Statistical significance was assessed at the 5% level.

¹³⁷ These models were selected because they satisfied two criteria: (i) they were among the 50 CRT TV models with the greatest sales volumes at Amazon during the data period; (ii) Amazon sold each model in at least 18 months.

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zero to 2.65.¹³⁸ 36% of the models had an average pass-through rate that differed from the average pass-through rate across all CRT monitors (0.88) by at least 0.1 and were also statistically significantly different (at the 5% level) from the overall average pass-through rate. Other retailers' data also indicate non-uniform pass-through rates across models.

138. Some of the heterogeneity in pass-through rates for the various products of a given retailer or manufacturer likely stems from differences in market conditions across different product categories and from time-varying practices (such as using certain models of TVs as loss leaders at a retailer). The heterogeneity may also be due to limitations in available data (e.g., lack of information about the rebates paid or received by a retailer). In either case, pass-through rates cannot reliably be estimated using a regression-based formulaic approach that pools together all products and time periods, and further disaggregation beyond the product-level disaggregation shown in Exhibit 27A is likely necessary. Individualized inquiries would be required to determine whether a particular purchase on a particular day from a particular retailer was impacted by the alleged cartel.

Dr. Netz's "Top-and-Bottom" Analysis of U.S. Pass-Through Rates Is Inherently Flawed for, among Other Reasons, Using Global CRT Prices.

139. In addition to attempting to estimate pass-through rates at a particular level of the vertical distribution chain for CRTs, Dr. Netz also attempts to estimate the overall pass-through rate from the top of the chain to the bottom. Specifically, in what she refers to as her "top-and-bottom" analysis, Dr. Netz examines the relationship between (i) a sample of U.S. online retail CRT TV prices reported by DisplaySearch, a market research firm, and (ii) the average global price of CRTs sold in the same period to TV manufacturers

¹³⁸ The model-level pass-through rates were estimated using the same approach as that used to generate pass-through estimates for Amazon and other entities listed in Exhibit 24A. See the Appendix for more details about the model-level analysis.

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located throughout the world. She contends that the associated average pass-through rate is 124%.¹³⁹

140. However, Dr. Netz has no way of knowing which CRTs sold globally are used in TVs sold in the U.S.¹⁴⁰ As explained in Section III.A, prices of CPTs sold to U.S.-based customers did not move in tandem with global prices for CPTs. Dr. Netz finds that there is a relationship between global CPT prices and the sample of U.S. online CRT TV prices only because of the two errors in her approach explained above. Correcting or at least mitigating these errors using my approach to estimating pass-through (as described above) leads to the conclusion that there is, on average, no discernible response in U.S. online CRT TV prices to Dr. Netz's measure of average global CPT prices.¹⁴¹ This is

¹³⁹ Netz Report, Exhibit 34. DisplaySearch provides data on the average monthly on-line retail prices of several individual TV models sold in the U.S. For each model, DisplaySearch also provides data on the manufacturer (brand), size, shape (flat/curved) and whether the TV is a HDTV. These characteristics are used as independent variables in Dr. Netz's regression and the price of each TV model in a month is the dependent variable. Dr. Netz assumes that the CPT cost of a given TV model in a given month equals the average global sales price of CPTs of the same size in that same month. (Global CPT sales prices are taken from data produced by seven Defendants in the instant matter.) Pass-through is estimated based on the coefficient of this cost variable. (Netz Report, pp. 98-99; 113-114)

¹⁴⁰ Dr. Netz also presents no evidence that the sample of online prices included in the DisplaySearch data is representative of all U.S. online CRT TV prices, much less all U.S. retail CRT TV prices.

¹⁴¹ The dependent variable in my regression (and in Dr. Netz's top-and-bottom regression) is the U.S. online price for a sample of CRT TV models (as reported by DisplaySearch) and the independent variables are the contemporaneous average global price for CPTs of the same size, product fixed effects, and a time trend (based on Defendants' global sales data). The estimated coefficient on global CPT price is not statistically different from zero at the 5% confidence level.

When compiling the dataset for her top-and-bottom regression, Dr. Netz mistakenly matches CPTs of a given size from the Defendants' sales data with CRT TVs of the same size from the DisplaySearch data. This approach is incorrect because the CRT size information she relies upon is based on the actual size of the tube, whereas CRT finished-product sizes generally refer to the product's "viewable size," which is slightly smaller. (Staff communication with TACP representative (May 2, 2012) and SEA representative (October 15, 2012.)) As a result of this error, Dr. Netz matches CRT TV prices to prices for CRTs that are smaller than the CRTs that would be used in those TVs. The error also leads Dr. Netz mistakenly to exclude certain CRT

(footnote continued ...)

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likely due to the lack of correlation between global CPT prices and North American CPT prices, on average, and/or due to the lack of pass-through at some point in the distribution chain.

Dr. Netz's "Top-to-Bottom" Analysis Is Also Flawed, as a Proper Regression Analysis Demonstrates.

141. In addition to her "top-and-bottom" pass-through estimate, Dr. Netz also provides what she terms a "top-to-bottom" pass-through estimate, which is an estimate of pass-through rates along the distribution chain for Toshiba TVs from the manufacturer to the end user. This "top-to-bottom" analysis traces CPTs through the following stages: (i) sales by TDD (a Toshiba subsidiary and a U.S.-based manufacturer of CRTs¹⁴²) of CPTs to TAEC (a Toshiba subsidiary and re-seller of CRTs); (ii) sales of the same CPTs by TAEC to TACP (a Toshiba-owned TV manufacturer with a TV manufacturing plant in North America¹⁴³); (iii) sales of CRT TVs by TACP to Costco; and (iv) Costco's sales of the same Toshiba CRT TVs to end users. Dr. Netz estimates three pass-through rates along this vertical chain and concludes that the total pass-through rate (the product of the three pass-through rates along the vertical chain) is 102%.¹⁴⁴

142. Dr. Netz's top-to-bottom analysis suffers from the same flaws as the rest of her pass-through analyses. For instance, they over-estimate average pass-through rates.

(... footnote continued)

TVs of certain sizes from her analysis. For example, Dr. Netz excludes prices for 27-inch TVs (a popular size) because the CRT sales data included no prices for 27-inch CRTs. However, had she corrected for the difference in actual and viewable size, she would have found that the CRT sales data contained prices for the 29-inch (actual size) CRT that would have been used in a 27-inch (viewable size) TV. As a result, Dr. Netz excludes 37% of TV price observations and 60% of CPT sales from her analysis. I correct for this error in my analysis and find that there are CPT price data for more than 98% of CRT TV prices and vice versa, meaning that almost no prices are excluded from the analysis.

¹⁴² Kurosawa (Toshiba Corp.) Deposition, p. 58.

¹⁴³ Deposition of Richard Huber, August 1, 2012 ("Huber (TAIS & TACP) Deposition"), p.68, 85-86; Uchiyama (TACP) Deposition, pp. 12, 47-49.

¹⁴⁴ Netz Report, p.103, Exhibit 33.

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Correcting for flaws in Dr. Netz's approach to estimating average pass-through rates (described above) produces lower estimates of average pass-through rates along the distribution chain than the rates estimated by Dr. Netz. For example, I estimate that TACP's average pass-through rate to all customers was 12%, not statistically significantly different from zero (vs. Dr. Netz's 112%). (See Exhibit 24A and Exhibit 25A.¹⁴⁵)

143. Dr. Netz also ignores the heterogeneity in TACP's pass-through rates. For example, in 26% of instances in which TACP's cost of manufacturing a CRT TV changed by at least 5% from one month to the next, TACP either did not change its retail sales price in the same direction or actually changed its price in the opposite direction to the cost change. (See Exhibit 24A¹⁴⁶)

144. Moreover, Dr. Netz's estimate of pass-through by TAEC is untenable because of the way TAEC reported its costs. A TAEC representative testified that TAEC, which purchases CRTs primarily from TDD, which is wholly owned by TAEC, sets the price that TDD charges to TAEC at TAEC's sales price discounted by a small amount.¹⁴⁷ Thus, the recorded cost of CRTs to TAEC is derived from prices that TAEC is able to charge for the same CRTs when TAEC re-sells those CRTs. Put differently, the sales prices of CRTs determine the cost of CRTs – not the other way around, as Dr. Netz assumes.

¹⁴⁵ In her top-to-bottom analysis, Dr. Netz uses somewhat different datasets than in her analysis of pass-through rates more generally. For example, her top-to-bottom analysis relies on TACP's TV sales to Costco and no other customers. However, even when I estimate my pass-through regression model using the same TACP data as Dr. Netz, the data reveal a lower pass-through rate than the rate estimated by Dr. Netz (23% vs. 94%).

¹⁴⁶ The TACP-related information in Exhibit 24A is based on TACP sales to all customers. However, confining the analysis to the same TACP data as Dr. Netz used to estimate in her top-to-bottom analysis (with sales only to Costco) leads qualitatively similar results, i.e., TACP's prices frequently did not change or changed in the opposite direction at the time of a cost change.

¹⁴⁷ Heinecke (TAEC) Deposition, pp. 99, 240-242.

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V. Establishing Impact and Estimating Damages

Dr. Netz's Proposed Methodology for Estimating the But-For Price for CRTs.

145. As discussed in Section III.B above, Dr. Netz does not estimate but-for CRT prices. Consequently, there is no basis in her report from which to conclude which CRT prices – if any – were above the competitive level. As discussed above, this is particularly true for CRT prices that were below the alleged target price, which is the case for the majority of transactions in Dr. Netz's target price analysis. It is also true even for prices that were above the alleged target price because, as Dr. Netz concedes, the actual prices may be for premium models while the target prices were generally for base models.¹⁴⁸

146. Although she does not estimate but-for prices, Dr. Netz nonetheless asserts that it is possible to do so using common evidence and methods.¹⁴⁹ To support this view, Dr. Netz identifies four different methods that she describes as reasonable and feasible approaches to estimating but-for CRT prices.¹⁵⁰ However, Dr. Netz describes these approaches at a very general level and fails to establish that any of them are, in fact, feasible or that they could be used to obtain reliable estimates of but-for CRT prices.

Dr. Netz's Proposed "Economic Determinants" Approach Fails Because Market Conditions Were Dramatically Different before and after the Proposed Class Period.

147. The first damages approach proposed by Dr. Netz (which she refers to as the "economic determinants method") uses the period prior to the class period and the period after the class period as benchmark time periods to estimate the relationship between CRT prices and their economic determinants (such as personal income and prices of related goods, raw materials, and labor costs) under competitive conditions.¹⁵¹ The

¹⁴⁸ Netz Report, p. 63.

¹⁴⁹ Netz Report, p. 84.

¹⁵⁰ *Id.*

¹⁵¹ Netz Report, pp. 85-88.

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estimated relationship would be used to estimate but-for CRT prices in the class period based on economic conditions during that time.

148. Such an approach could produce a reasonable estimate of but-for CRT prices only if CRT market conditions before the beginning of the class period (i.e., before March 1995) and after the class period (i.e., after November 2007) were similar to CRT market conditions during the class period or if any important differences in market conditions could be reflected in measurable and identifiable variables with quantified variations. Otherwise, if conditions were materially different in ways that could not be accurately reflected in the analysis, then the years before and after the class period would provide no guidance to estimating but-for prices during the class period. Despite the importance of demonstrating that this condition is satisfied before employing the “economic determinants method,” Dr. Netz’s report is silent on this issue.

149. In fact, conditions were materially different between these time periods. Prior to 1995, LCD and plasma technologies were costly niche technologies, but during the class period their prices dropped dramatically and they mostly displaced CRTs. In 1995, CRTs dominated TV and desktop monitor sales. By late 2007, CRTs’ share of global monitor sales had declined to just 10%, and their share of TV sales had dropped to 48%.¹⁵² As explained earlier in this report, CRT prices sharply declined in part as a result of this competitive pressure during the class period. Given the dramatic differences in the competitive conditions in the pre-1995 period, pricing in that period does not provide a basis for estimating but-for prices in the class period, and the same is true for the period after 2007.¹⁵³

¹⁵² See Exhibit 4A

¹⁵³ Dr. Netz proposes to control for changes in marketplace conditions that could affect demand for CRTs, but none of the data that she propose to use for this purpose – U.S. personal income, U.S. GDP, U.S. employment data, and a data series on “global economic activity” (Netz Report, p. 87) – would account for changes in the impact that competition from LCD and plasma technologies had on demand for CRTs.

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Dr. Netz Has Not Established that Her “Benchmark Products” Are Appropriate Benchmarks.

150. The second approach proposed by Dr. Netz to estimate putative antitrust overcharges relies on using benchmark *products* instead of benchmark *periods*. Specifically, Dr. Netz proposes to use VHS recorders and portable CD players as benchmarks because they “exhibit scale sensitive manufacturing, are precision electronics devices, and were replaced by alternative technologies...”¹⁵⁴ and because certain firms that manufactured these devices also manufactured CRTs.¹⁵⁵ Dr. Netz proposes to compare the profit margins that vendors earned from the sale of portable CD players and VHS recorders with the profit margins Defendants earned from the sale of CRTs; any difference in profit margins would be attributed to the impact of the alleged CRT cartel.

151. As a threshold matter, Dr. Netz’s benchmark approach assumes that Defendants’ CRT operations earned higher profit margins than manufacturers of VHS recorders and portable CD players. If Defendants’ CRT profit margins were, in fact, lower than the profit margins earned by most manufacturers of VHS recorders and portable CD players, then the benchmark products proposed by Dr. Netz would imply that the alleged cartel was ineffective. Since Dr. Netz has not offered even an initial comparison of profit margins across these industries, she has failed to provide any evidence that her proposed benchmark products’ profits satisfy this threshold requirement.

152. Even if Defendants’ CRT profit margins were higher than profit margins earned by most manufacturers of VHS recorders and portable CD players, the difference may have been due to many factors other than the alleged cartel. For example, empirical studies have demonstrated that the magnitude of scale economies and market structure in an industry typically influence profits in that industry.¹⁵⁶ In order to establish that VHS

¹⁵⁴ Netz Report, p. 90

¹⁵⁵ Id.

¹⁵⁶ “Measures of scale economies or capital requirements tend to be positively correlated with industry-level accounting profitability.” Schmalensee, R. (1989). *Inter-Industry Studies of*

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recorders or portable CD players could serve as a proper benchmark for CRTs, Dr. Netz would need to establish that economies of scale (among other factors) were comparable in magnitude across VHS recorders or portable CD players and CRTs. She has not even attempted to do so. Moreover, because Dr. Netz proposes to compare CRTs to other products that were in decline, her comparison would be highly sensitive to the precise point of each product's decline phase that she would compare as well as the rate of decline. Comparing CRT manufacturers' profits to a point too late in the decline of VHS recorders or portable CD players could lead to an underestimate of but-for CRT profit margins. Yet Dr. Netz offers no explanation as to how she would determine the proper comparison point. In sum, Dr. Netz has not established that VHS recorders and portable CD players, nor any other products, can serve as appropriate benchmarks.

Dr. Netz's "Market Power" Approach Fails Because the Critical Assumption, that the Defendants Acted as a Single Firm, Cannot Be Made for the CRT Market.

153. The third approach proposed by Dr. Netz assumes that the Defendants obtained additional market power through the alleged collusion and involves estimating the reduction in market power each Defendant would face in the absence of such collusion. In particular, Dr. Netz proposes to measure how much lower each firm's market power would have been absent the alleged collusion by estimating how much higher its demand elasticity would have been in the but-for world. She would then translate the estimated difference in demand elasticity into a but-for price using theoretical Lerner Index relationships that by equations relate a firm's profit margin to its demand elasticity.¹⁵⁷

154. This approach hinges on the assumption that the Defendants acted as a single firm. In particular, Dr. Netz proposes to estimate the elasticity of demand facing the

(... footnote continued)

Structure and Performance. In R. Schmalensee and R. Willig (Eds.), *Handbook of Industrial Organization*, Elsevier. p. 978.

¹⁵⁷ Netz Report, p. 96.

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alleged cartel based on the collective market of its alleged members.^{158,159} If the alleged cartel did not function equivalently to a single firm, the approach proposed by Dr. Netz would overstate its market power (and hence distort estimates of but-for prices). This was explained in the very article that Dr. Netz cites in discussing her approach.

If the cartel is able to enforce its cartel price and output allocation scheme among its members, it will behave as if it were a single large firm and the Lerner index will measure its market power. If, as is more likely, the cartel agreement is imperfectly enforced, output will tend to be greater and price lower, and the Lerner index will overstate the cartel's market power.¹⁶⁰

155. Even if the alleged cartel managed to elevate prices of some CRTs, it does not follow that it elevated prices of all CRTs to the level that a single firm controlling all of the alleged cartel members' production and prices would charge. The economics literature on coordination among competitors recognizes that even successful cartels may not achieve the joint profit maximization that Dr. Netz's proposed model assumes, for example, due to firms having imperfect or asymmetric information.¹⁶¹ Moreover, the assumption is particularly untenable in the extant case because, as discussed in Section

¹⁵⁸ *Id.* Dr. Netz also proposes to measure the Defendants' actual and but-for demand elasticities using their price-cost margins (*Id.*, p. 96-97), but the logic of this approach is completely circular. In particular, the whole purpose of estimating each Defendant's but-for demand elasticity would be to estimate its but-for price. Thus, if Dr. Netz already knew each Defendant's but-for price and cost, there would be no need to estimate its but-for demand elasticity.

¹⁵⁹ It is worth noting that Dr. Netz refers to the use of "market shares," but she has not offered an opinion on the relevant antitrust market(s). To the extent that the relevant markets are narrower than a single worldwide market including all CRTs – which is highly likely given the evidence presented in Section III.A above – Dr. Netz would need to conduct her analysis separately for each relevant market.

¹⁶⁰ Landes, W. M., & Posner, R. A. (1981). Market Power in Antitrust Cases. *Harvard Law Review*, volume 9(5). p. 951.

¹⁶¹ See, e.g., Green, E. J., & Porter, R. H. (1984). Noncooperative Collusion under Imperfect Price Information. *Econometrica*. Vol. 52, No. 1. pp. 87-100. See also Athey, S., & Bagwell, K. (2001). Optimal Collusion with Private Information. *The RAND Journal of Economics*, Vol. 32, No.3. pp. 428-465. Dr. Netz has acknowledged that it would be rational for firms to participate a cartel even if they were only effective at raising prices in some regions, for some products, or for some customers. Netz Deposition, pp. 152-154.

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III.B above, a majority of the prices Defendants charged for CRTs were below the alleged target price identified by Dr. Netz even without taking into account the inherent bias (which she acknowledged) in her target price analysis. This finding – which is based on Dr. Netz’s analysis – is inconsistent with her proposed model’s assumption that the alleged cartel members charged the same prices that would be charged by a single, combined firm. Because this assumption is required for Dr. Netz’s proposed approach, the approach would systematically overstate the market power of the alleged cartel and consequently would also overstate the alleged overcharge.

Dr. Netz’s “Simulated Merger” Approach Fails Because the Critical Assumption, that the Defendants Acted as a Single Firm, Cannot Be Made for the CRT Market and Because Dr. Netz Has Not Explained How She Would Construct Such a Model.

156. The fourth approach proposed by Dr. Netz for estimating the alleged antitrust overcharges is to construct a model of the CRT industry and then simulate the price effects of the alleged cartel by simulating a merger among all Defendants.¹⁶² More precisely, since the IPP class alleges that Defendants acted to maximize joint profits during the class period, Dr. Netz would use her proposed approach to simulate the impact of having the Defendants act independently. As an initial matter, Dr. Netz’s proposed simulation approach suffers from the same flaws as the previous approach, namely that it assumes that the alleged cartel members acted as a single, merged firm despite overwhelming evidence that Defendants more often than not deviated from the allegedly agreed upon prices.

157. Additionally, Dr. Netz has not established that her proposed simulation approach can be implemented in the CRT context because she has not described how she would construct a model that would be consistent with material features of the CRT marketplace. The economics literature on simulation methods has long recognized that results from these models are highly sensitive to the particulars of a marketplace, and

¹⁶² Netz Report, pp. 92-96.

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such models have to be carefully customized to the realities of the marketplace. These challenges are described by one economics textbook as follows:

Merger simulation exercises rely heavily on structural assumptions about the nature of consumer demand, the nature of costs, firms' objectives and behavior, and the nature of equilibrium – the latter in the sense that differing firm objectives must be reconciled. Ensuring that their assumptions are sufficiently consistent with reality is an essential component of a well-done piece of simulation work. In particular, the choice of strategic variables and the importance of static versus dynamic effects must be evaluated so that the model incorporates the actual drivers of market outcomes. The promise of merger simulation models is not easy to deliver on within statutory time limits.¹⁶³

158. To take just one example of such complexity, merger simulation models are highly sensitive to assumptions about entry, exit, and product repositioning by sellers.¹⁶⁴ During the class period, many CRT manufacturers exited the industry because of declining demand for CRT TVs and monitors. This process of exit would likely have been accelerated if, as Plaintiffs allege, CRT prices would have had declined even faster in the but-for world than they did in the actual world. A merger simulation model would be highly sensitive to the assumptions that Dr. Netz would make about which CRT companies would have exited (or how they would have re-positioned their products), and yet she provides no discussion of how she would determine the industry structure and the timing of exit and product repositioning in the CRT but-for world. At least of equal importance to the modeling would be the treatment of the entry and expansion of the new

¹⁶³ Davis, P., & Garcés, E. (2010). *Quantitative Techniques for Competition and Antitrust Analysis*. Princeton University Press. pp. 434-435.

¹⁶⁴ The sensitivity of merger simulations to the composition of suppliers has been noted by economists. See, e.g., Leonard, G. K., & Zona, D. J. (2008). Simulation in Competitive Analysis. *Competition Law and Policy*, ABA Section of Antitrust Law, (Issue 2). pp. 1420-1421. “Merger simulations are typically performed assuming that the products and the products’ characteristics are fixed. Yet, repositioning of existing products or entry by new firms, in response to a post-merger price increase, may in part eliminate any such increase at least in the long run. In this sense, the typical merger simulation predicts the upper bound on long-run competitive effects. On the other hand, the merger may affect the entry and expansion strategies of competitors post-merger. In principle, repositioning or entry could be built into the merger simulation by specifying a more complex model, although this normally has not been done in practice to date.”

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LCD and plasma technologies and the firms marketing them during the pertinent time-frame. The model would have to specify when the relevant market(s) expanded to include the new technologies and what were the own-price and cross-price elasticities of demand for the different stages of competition between TVs and monitors using the old and new technologies.

159. Despite the sensitivity of merger simulations to the model's many assumptions, Dr. Netz has not laid out any of the assumptions she would make if she were to attempt to implement such an approach. As a result, Dr. Netz has not provided any support for the view that she would be able to construct a simulation model to reliably predict but-for prices.

160. In sum, Dr. Netz describes her methods for estimating but-for prices at a very general level and fails to establish that any of them are, in fact, feasible or that they could be used to obtain reliable estimates of but-for CRT prices.

VI. Conclusion

161. Overall, it is my conclusion that the fact of impact on all (or almost all) of the members of the proposed IPP class from the alleged collusion among the defendant CRT producers cannot be established by means of common evidence. Prices of the different CRT finished products and CRTs changed very differently from each other from month to month, quarter to quarter and over the span of the class period, and this heterogeneity was due to substantially different market forces that applied to various CRT product segments at various points during the class period. Moreover, pass-through rates were not uniform across various stages of the long and complex distribution channels and a significant fraction of cost changes may not have been passed on to end-users at all by some manufacturers and re-sellers. The substantial variation in the rate at which costs were passed through (if at all) is another reason why the substantial diversity of pricing levels and movements that is apparent from the pricing data shows that individualized inquiries would be necessary to assess whether most of the members of the proposed class were impacted by the alleged collusion.

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VII. Appendix: Data and Methods Used in Pass-Through Analyses

A. Introduction

162. This appendix describes the regression specifications and underlying data construction for Exhibits 25-27. Sections VII.B and VII.C describe the baseline regression model and data construction for all pass-through regression analyses. Sections VII.D through VII.G discuss the regression results, robustness checks, the regression specification used in Exhibit 27, and entities excluded from the analysis, respectively.

B. The Baseline Regression Model

163. In order to generate the pass-through estimates listed in Exhibit 25, a separate regression analysis was performed for each entity (retailer and manufacturer). The baseline regression specification for each entity is:

$$(1) \quad price_{it} = \alpha + \beta cost_{it} + \gamma trend_{it} + \sum_{j=2}^N \delta_j D_j + \varepsilon_{it},$$

where

- a) $price_{it}$ represents the average sale price of product i in month t at a given entity (e.g., a particular model of TV's average retail price at Costco in a month),
- b) $cost_{it}$ represents the average cost of product i in month t (either wholesale procurement price for retailers, or a measure of unit production cost for manufacturers),
- c) $trend_{it}$ is a linear time trend variable that increase by 1 each calendar month, adjusted for the product's overall price level,¹⁶⁵ and

¹⁶⁵ The trend variable acts as a control for general marketplace trends and the tendency of suppliers of CRT finished products to reduce the price of older models. I adjust (multiply) the trend variable for each product by the product's lifetime average price (for that retailer) because prices of more expensive products tended to decline more rapidly over time (in dollar terms) than prices of cheaper products. Thus, for example, in month 1 when the trend variable equals 1, the adjusted trend variable for a product equals the average lifetime price of that product times 1. In month 2, this variable equals twice the average lifetime price and so on. As discussed below, the results are robust to different formulations of the trend variable.

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- d) D_j for $j = 2, \dots, N$ are a series of $N-1$ dummy variables, where D_j equals 1 for product $j=i$ and zero otherwise (product fixed effects).
- e) Robust standard errors were used in the estimation to account for heteroskedasticity.

164. The regressions are weighted by sales quantity using analytical weights (except for Gateway and Sanyo/Walmart, for which data on sales quantities are unavailable). Specifically, product-month pairs that had higher sale quantities were given more weight in the regression. By contrast, Dr. Netz uses frequency weights. Frequency weights are an alternative method of assigning more weight to observations that have higher sales quantities (by creating a duplicate observation for each unit sold in a transaction). Frequency weights and analytical weights produce identical coefficient estimates, but frequency weights lead to artificially lower estimates of standard errors. As a result, tests of statistical significance are more conservative when using analytical weights.

C. Data Construction

165. The entities used in Exhibit 25 include six brick-and-mortar retailers (Circuit City, Costco, Fry's, OfficeMax, Sam's Club, and Walmart), six Internet retailers (Amazon, Buy.com, CDW, PC Connection, PC Mall and Zones), five product distributors (Arrow Electronics, BenQ America, Ingram Micro, TAIS, and Tech Data), and four product manufacturers (Funai, Gateway, Tatung, and TACP).

Overview

166. With the exception of Ingram Micro, TACP, and Circuit City, the analyses are based on the same data used by Dr. Netz in the analyses she reports in Exhibit 34 of her declaration. The data provide CRT finished product model-level information on sales price (typically at the transaction level) and either wholesale procurement cost (for resellers) or manufacturing cost (for product manufacturers). See the section on granularity and frequency of the data, below, for more details.

- a) In my analysis, Ingram Micro's average cost was determined using the *Replacement Cost* field instead of the *Unit Avg Cost at Ship* field that Dr. Netz

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relied on to measure Ingram Micro's cost. The decision to use the *Replacement Cost* field was based on communications my staff had with an Ingram Micro representative on November 1, 2012.¹⁶⁶

- b) In her use of TACP TV sales data, Dr. Netz excluded a large number of sales marked "Not For Sale In USA & PR." However, in my analysis, records with "Not for sale in the U.S." in the description field but a ship-to or bill-to address in the United States were included. This decision was based on information received on November 14, 2012 from TACP indicating that such sales were, in fact, made in the U.S.¹⁶⁷
- c) Dr. Netz did not estimate pass-through rates for Circuit City, one of the three largest retailers of CRT products. I have included Circuit City in my analysis. Circuit City data are available at the product-region-month level.

Data Filters

167. The same data preparation and filters Dr. Netz used to compile the datasets used in the analyses reported in Exhibit 34 of her report were used in my analyses reported in Exhibits 25-27.¹⁶⁸

Identifying CRT Products and Product Characteristics in the Sales Data

168. Most entities provided data limited mostly to products identified as CRTs and sold in the United States. Remaining non-CRT products were identified and removed based on the presence of certain keywords (e.g., LCD, Plasma, TFT) in the product description or classification fields in the data. Non-U.S. sales were identified and removed based on ship-to or bill-to address, where possible.

¹⁶⁶ The Ingram Micro representative indicated that the *Replacement Cost* field was the most reliable measure of cost in the data.

¹⁶⁷ Information received from a TACP representative on November 14, 2012 indicated that the description "Not For Sale In USA & PR" merely indicates that the products were no longer sold in the U.S. or Puerto Rico at the time the sales data were extracted for production.

¹⁶⁸ For example, in her analysis of PC Connection's pass-through rates for CRT monitors, Dr. Netz excludes sales at prices below \$20. She applied similar (although not always identical) filters to the price and cost data for other entities. For some entities, Dr. Netz also excludes prices above a certain threshold (e.g., for Costco, she excludes TV sales at prices above \$5,000 and monitor sales at prices above \$1,000).

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169. Characteristics associated with a given product (e.g., flat screen, HDTV, VCR/TV combo) were identified based on the product description fields included in the data. When the description field is inconsistent across different records for the same model number, the most prevalent classification was used to classify the product's attributes.

Granularity and Frequency of the Data

170. Exhibit 28A details the level of aggregation (e.g., transaction level, weekly or monthly average) associated with each entity's produced sales data. Prior to estimating pass-through rates, the data for each entity were aggregated by product and month; weighted average prices and costs for each product and month were calculated using the quantity sold (or procured) as weights. A product was uniquely identified by a model or item number.^{169, 170}

171. Exhibit 28A also distinguishes between what I refer to as "synchronized" and "unsynchronized" datasets. For synchronized datasets, each record in the sales data includes the (i) transaction (or monthly) price (or revenue) and quantity, and (ii) some measure of the procurement or manufacturing cost associated with the product. For unsynchronized datasets, the procurement cost data and sales data were produced in separate files. In my analysis, these files were separately aggregated by product and month and then combined.^{171, 172}

¹⁶⁹ For OfficeMax, a product was uniquely identified by model number, distribution channel, and condition type.

¹⁷⁰ If a particular model or item number reappeared in the data a year or more after it had been last sold, it was classified as a new product.

¹⁷¹ Sales data for a particular product and month were excluded if there was no cost data for that product and month and vice versa.

¹⁷² For unsynchronized data, the level to which Dr. Netz aggregated the procurement cost data before combining it with the sales data varied by entity. Exhibit 28A identifies the level of aggregation she employed for each unsynchronized dataset.

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D. Regression Results and Pass-through Estimates

172. The regression coefficients, R-squared and number of observations are presented in Exhibit 25A. The coefficient on the time trend variable is negative and statistically different from zero¹⁷³ in most cases.¹⁷⁴

E. Robustness Checks

173. I have performed a number of robustness checks on the model specifications used for the results reported in Exhibit 25A. In each case, using the alternative specification produces qualitatively similar results:

- a) The baseline results use monthly frequency data. I have also used data at the product-quarter (rather than product-month) level.
- b) Data at the transactions level (rather than product-month level).
- c) Regressions without using weights.
- d) Regressions with frequency weights (the same weights used in Exhibit 34 of Dr. Netz's report).
- e) In addition, the regressions were estimated with (a) a linear time trend (unadjusted for each product's average price level), (b) time (quarterly) fixed effects, and (c) scaled log of time trend.

F. Specification for Exhibit 27

174. A separate regression analysis was performed for each entity. The regression specification is given by:

$$(2) \quad price_{it} = \alpha + \sum_{j=1}^N \beta_j D_j cost_{jt} + \gamma trend_{it} + \sum_{j=2}^N \delta_j D_j + \varepsilon_{it},$$

Where

- a) $price_{it}$ represents the average sale price of product i in month t (e.g., the retail price of a TV at Costco),

¹⁷³ For convenience, unless otherwise noted, I use the term “statistically different from X” in this appendix to indicate that an estimate is statistically significantly different from X at the 5% confidence level.

¹⁷⁴ The estimated coefficient on the time trend is positive and statistically significant in only two out of the thirty-five regressions reported in Exhibit 25A

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- b) $cost_{jt}$ represents the average cost of product j in month t (either wholesale price for retailers, or a measure of unit production cost for manufacturers) when $j=i$,
- c) $trend_{it}$ represents the number of calendar months since the first month for which there are observations in the data, adjusted for the product's overall price level,¹⁷⁵ and
- d) D_j for $j = 2, \dots, N$ are a series of $N-1$ dummy variables, where D_j equals 1 for product $j=i$ and zero otherwise (product fixed effects).
- e) Robust standard errors were used in the estimation, to account for heteroskedasticity.

175. The regressions were weighted by sales quantity using analytical weights. Specifically, product-month pairs that had larger sale quantities were given more weight in the regression. As noted in Section VII.B above, Dr. Netz uses frequency weights, which artificially lead to lower estimates of the standard errors and thus produce less conservative tests of statistical significance.

G. Entities Excluded from Pass-Through Analyses Reported in Exhibits 24-26

176. The following entities were excluded from the analyses reported in Exhibit 24-26 for the reasons detailed below:

- a) Dell Monitors data: In information received on November 20, 2012, Dell indicated that whenever a CRT monitor was sold as part of a bundle (likely with a computer and other components), the sale price did not reflect actual revenue received from the sale of the monitor since Dell did not allocate revenues from bundled sales to the monitor. The data do not separate monitors sold in bundles from monitors sold alone.
- b) Best Buy: Based on information received on December 11, 2012, the average unit cost that is included in Best Buy's synchronized sales data is calculated over all units of the product that Best Buy purchased prior to the date of the sale. That is, the average cost represents an average taken over the entire life of the product, regardless of how many units are left in the inventory at the

¹⁷⁵ The trend variable acts as a control for general marketplace trends and the tendency of suppliers of CRT finished products to reduce the price of older models. I multiply the trend variable for each product by the product's general price level because prices of more expensive products tended to decline more rapidly over time (in dollar terms) than prices of cheaper products. As discussed above, the results are robust to different formulations of the trend variable.

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time of the sale. As a result, Best Buy's average cost field does not represent a consistent or reliable measure of the procurement cost for the product sold in a given transaction, particularly since the wholesale prices of CRT products tended to decrease over time.

- c) TAEC: The correlation between the price at which TAEC sold a CRT to TACP and cost at which TAEC acquired the same CRT is 1 in the data relied upon by Dr. Netz in her top-to-bottom analysis. However, the high degree of correlation between TAEC's price and cost is not evidence that TAEC passes-through 100% of changes in its costs. It is instead a direct result of the way the prices that TAEC paid TDD (which is wholly owned by TAEC) were set. In particular, TDD's prices to TAEC were based on TAEC's sales price discounted by a small amount.¹⁷⁶ Because changes in the price TAEC paid TDD were the direct result of changes in TAEC's sales price (and not the other way around), one cannot draw meaningful conclusions about TAEC's pass-through rate based on an analysis of its prices and costs.

¹⁷⁶ Heinecke (TAEC) Deposition, pp. 99, 240-242.

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I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief. This declaration was executed on the 17th day of December 2012 in Princeton, New Jersey.

A handwritten signature in black ink, reading "Robert Willig", written over a horizontal line.

Robert D. Willig

Appendix A

Curriculum Vitae

Name: **Robert D. Willig**

Address: 220 Ridgeview Road, Princeton, New Jersey 08540

Birth: 1/16/47; Brooklyn, New York

Marital Status: Married, four children

Education: Ph.D. Economics, Stanford University, 1973
Dissertation: Welfare Analysis of Policies
Affecting Prices and Products.
Advisor: James Rosse

M.S. Operations Research, Stanford University, 1968.

A.B. Mathematics, Harvard University, 1967.

Professional Positions:

Professor of Economics and Public Affairs, Princeton University, 1978-.

Principal External Advisor, Infrastructure Program, Inter-American Development Bank, 6/97-8/98.

Deputy Assistant Attorney General, U.S. Department of Justice, 1989-1991.

Supervisor, Economics Research Department, Bell Laboratories, 1977-1978.

Visiting Lecturer (with rank of Associate Professor), Department of Economics and Woodrow Wilson School, Princeton University, 1977-78 (part time).

Economics Research Department, Bell Laboratories, 1973-77.

Lecturer, Economics Department, Stanford University, 1971-73.

Other Professional Activities:

ABA Section of Antitrust Law Economics Task Force, 2010-2012

Advisory Committee, Compass Lexecon 2010 -,

OECD Advisory Council for Mexican Economic Reform, 2008 -2009,

Senior Consultant, Compass Lexecon, 2008 -,

Director, Competition Policy Associates, Inc., 2003-2005

Advisory Board, Electronic Journal of Industrial Organization and Regulation Abstracts, 1996-.

Advisory Board, Journal of Network Industries, 2004-.

Visiting Faculty Member (occasional), International Program on Privatization and Regulatory Reform, Harvard Institute for International Development, 1996-2000.

Member, National Research Council Highway Cost Allocation Study Review Committee, 1995-98.

Member, Defense Science Board Task Force on the Antitrust Aspects of Defense Industry Consolidation, 1993-94.

Editorial Board, Utilities Policy, 1990-2001

Leif Johanson Lecturer, University of Oslo, November 1988.

Member, New Jersey Governor's Task Force on Market-Based Pricing of Electricity, 1987-89.

Co-editor, Handbook of Industrial Organization, 1984-89.

Associate Editor, Journal of Industrial Economics, 1984-89.

Director, Consultants in Industry Economics, Inc., 1983-89, 1991-94.

Fellow, Econometric Society, 1981-.

Organizing Committee, Carnegie-Mellon-N.S.F. Conference on Regulation, 1985.

Board of Editors, American Economic Review, 1980-83.

Nominating Committee, American Economic Association, 1980-1981.

Research Advisory Committee, American Enterprise Institute, 1980-1986.

Editorial Board, M.I.T. Press Series on Government Regulation of Economic Activity, 1979-93.

Program Committee, 1980 World Congress of the Econometric Society.

Program Committee, Econometric Society, 1979, 1981, 1985.

Organizer, American Economic Association Meetings: 1980, 1982.

American Bar Association Section 7 Clayton Act Committee, 1981.

Principal Investigator, NSF grant SOC79-0327, 1979-80; NSF grant 285-6041, 1980-82; NSF grant SES-8038866, 1983-84, 1985-86.

Aspen Task Force on the Future of the Postal Service, 1978-80.

Organizing Committee of Sixth Annual Telecommunications Policy Research Conference, 1977-78.

Visiting Fellow, University of Warwick, July 1977.

Institute for Mathematical Studies in the Social Sciences, Stanford University, 1975.

Published Articles and Book Chapters:

"Competition and innovation-driven inclusive growth" (with Mark Dutz, Ioannis Kessides and Stephen O'Connell), in Promoting Inclusive Growth: Challenges and Policies, Luiz de Mello and Mark Dutz (eds.), OECD, 2011.

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Social Welfare: Theory and Policy, Robert E. Kuenne (ed.), Blackwell, 2000, pp. 86-97; reprinted in Readings in Microeconomic Theory, M. M. La Manna (ed.), Dryden Press, 1997, pp. 201-212.

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"The Optimal Provision of Journals Qua Sometimes Shared Goods," (with J. Ordovery), American Economic Review, V. 68, No. 3, June 1978, pp. 324-338.

"On the Comparative Statics of a Competitive Industry With Infra-marginal Firms," (with J. Panzar), American Economic Review, V. 68, No. 3, June 1978, pp. 474-478.

"Pareto Superior Nonlinear Outlay Schedules," Bell Journal of Economics, Vol. 9, No. 1, Spring 1978, pp. 56-69.

"Predatoriness and Discriminatory Pricing," in The Economics of Anti-Trust: Course of Study Materials, American Law Institute-American Bar Association, 1978.

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Books

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“Why Do Christie and Schultz Infer Collusion From Their Data? (with Alan Kleidon), 1995.

"Demonopolization," (with Sally Van Siclen), OECD Vienna Seminar Paper, 1993.

"Economic Analysis of Section 337: The Balance Between Intellectual Property Protection and Protectionism," (with J. Ordover) 1990.

"The Effects of Capped NTS Charges on Long Distance Competition," (with M. Katz).

"Discussion of Regulatory Mechanism Design in the Presence of Research Innovation, and Spillover Effects," 1987.

"Industry Economic Analysis in the Legal Arena," 1987.

"Deregulation of Long Distance Telephone Services: A Public Interest Assessment," (with

M. Katz).

"Competition-Related Trade Issues," report prepared for OECD.

"Herfindahl Concentration Index," (with J. Ordover), Memorandum for ABA Section 7 Clayton Act Committee, Project on Revising the Merger Guidelines, March 1981.

"Market Power and Market Definition," (with J. Ordover), Memorandum for ABA Section 7 Clayton Act Committee, Project on Revising the Merger Guidelines, May 1981.

"The Continuing Need for and National Benefits Derived from the REA Telephone Loan Programs - An Economic Assessment," 1981.

"The Economics of Equipment Leasing: Costing and Pricing," 1980.

"Rail Deregulation and the Financial Problems of the U.S. Railroad Industry," (with W.J. Baumol), report prepared under contract to Conrail, 1979.

"Price Indexes and Intertemporal Welfare," Bell Laboratories Economics Discussion Paper, 1974.

"Consumer's Surplus: A Rigorous Cookbook," Technical Report #98, Economics Series, I.M.S.S.S., Stanford University, 1973.

"An Economic-Demographic Model of the Housing Sector," (with B. Hickman and M. Hinz), Center for Research in Economic Growth, Stanford University, 1973.

Invited Conference Presentations:

Georgetown Center for Business and Public Policy, Conference on the Evolution of Regulation	
"Reflections on Regulation"	2011

Antitrust Forum, New York State Bar Association	
"Upward Price Pressure, Market Definition and Supply Mobility"	2011

American Bar Association, Antitrust Section, Annual Convention	
"The New Merger Guidelines' Analytic Highlights"	2011

OECD and World Bank Conference on Challenges and Policies for Promoting Inclusive Growth	
"Inclusive Growth From Competition and Innovation"	2011

Villanova School of Business Executive MBA Conference	
"Airline Network Effects, Competition and Consumer Welfare"	2011

NYU School of Law Conference on Critical Directions in Antitrust "Unilateral Competitive Effects"	2010
Conf. on the State of European Competition Law and Enforcement in a Transatlantic Context "Recent Developments in Merger Control"	2010
Center on Regulation and Competition, Universidad de Chile Law School "Economic Regulation and the Limits of Antitrust Law"	2010
Center on Regulation and Competition, Universidad de Chile Law School "Merger Policy and Guidelines Revision"	2010
Faculty of Economics, Universidad de Chile "Network Effects in Airlines Markets"	2010
Georgetown Law Global Antitrust Enforcement Symposium "New US Merger Guidelines"	2010
FTI London Financial Services Conference "Competition and Regulatory Reform"	2010
NY State Bar Association Annual Antitrust Conference "New Media Competition Policy"	2009
Antitrust Law Spring Meeting of the ABA "Antitrust and the Failing Economy Defense"	2009
Georgetown Law Global Antitrust Enforcement Symposium "Mergers: New Enforcement Attitudes in a Time of Economic Challenge"	2009
Phoenix Center US Telecoms Symposium "Assessment of Competition in the Wireless Industry"	2009
FTC and DOJ Horizontal Merger Guidelines Workshop "Direct Evidence is No Magic Bullet"	2009
Northwestern Law Research Symposium: Antitrust Economics and Competition Policy "Discussion of Antitrust Evaluation of Horizontal Mergers"	2008
Inside Counsel Super-Conference "Navigating Mixed Signals under Section 2 of the Sherman Act"	2008
Federal Trade Commission Workshop on Unilateral Effects in Mergers "Best Evidence and Market Definition"	2008

European Policy Forum, Rules for Growth: Telecommunications Regulatory Reform “What Kind of Regulation For Business Services?”	2007
Japanese Competition Policy Research Center, Symposium on M&A and Competition Policy “Merger Policy Going Forward With Economics and the Economy”	2007
Federal Trade Commission and Department of Justice Section 2 Hearings “Section 2 Policy and Economic Analytic Methodologies”	2007
Pennsylvania Bar Institute, Antitrust Law Committee CLE “The Economics of Resale Price Maintenance and Class Certification”	2007
Pennsylvania Bar Institute, Antitrust Law Committee CLE “Antitrust Class Certification – An Economist’s Perspective”	2007
Fordham Competition Law Institute, International Competition Economics Training Seminar “Monopolization and Abuse of Dominance”	2007
Canadian Bar Association Annual Fall Conference on Competition Law “Economic Tools for the Competition Lawyer”	2007
Conference on Managing Litigation and Business Risk in Multi-jurisdiction Antitrust Matters “Economic Analysis in Multi-jurisdictional Merger Control”	2007
World Bank Conference on Structuring Regulatory Frameworks for Dynamic and Competitive South Eastern European Markets “The Roles of Government Regulation in a Dynamic Economy”	2006
Department of Justice/Federal Trade Commission Section 2 Hearings “(Allegedly) Monopolizing Tying Via Product Innovation”	2006
Fordham Competition Law Institute, Competition Law Seminar “Monopolization and Abuse of Dominance”	2006
Practicing Law Institute on Intellectual Property Antitrust “Relevant Markets for Intellectual Property Antitrust”	2006
PLI Annual Antitrust Law Institute “Cutting Edge Issues in Economics”	2006
World Bank’s Knowledge Economy Forum V “Innovation, Growth and Competition”	2006
Charles University Seminar Series “The Dangers of Over-Ambitious Antitrust Regulation”	2006

NY State Bar Association Antitrust Law Section Annual Meeting “Efficient Integration or Illegal Monopolization?”	2006
World Bank Seminar “The Dangers of Over-Ambitious Regulation”	2005
ABA Section of Antitrust Law 2005 Fall Forum “Is There a Gap Between the Guidelines and Agency Practice?”	2005
Hearing of Antitrust Modernization Commission “Assessment of U.S. Merger Enforcement Policy”	2005
LEAR Conference on Advances in the Economics of Competition Law “Exclusionary Pricing Practices”	2005
Annual Antitrust Law Institute “Cutting Edge Issues in Economics”	2005
PRIOR Symposium on States and Stem Cells “Assessing the Economics of State Stem Cell Programs”	2005
ABA Section of Antitrust Law – AALS Scholars Showcase “Distinguishing Anticompetitive Conduct”	2005
Allied Social Science Associations National Convention “Antitrust in the New Economy”	2005
ABA Section of Antitrust Law 2004 Fall Forum “Advances in Economic Analysis of Antitrust”	2004
Phoenix Center State Regulator Retreat “Regulatory Policy for the Telecommunications Revolution”	2004
OECD Competition Committee “Use of Economic Evidence in Merger Control”	2004
Justice Department/Federal Trade Commission Joint Workshop “Merger Enforcement”	2004
Phoenix Center Annual U.S. Telecoms Symposium “Incumbent Market Power”	2003
Center for Economic Policy Studies Symposium on Troubled Industries “What Role for Government in Telecommunications?”	2003

Princeton Workshop on Price Risk and the Future of the Electric Markets “The Structure of the Electricity Markets”	2003
2003 Antitrust Conference “International Competition Policy and Trade Policy”	2003
International Industrial Organization Conference “Intellectual Property System Reform”	2003
ABA Section of Antitrust Law 2002 Fall Forum “Competition, Regulation and Pharmaceuticals”	2002
Fordham Conference on International Antitrust Law and Policy “Substantive Standards for Mergers and the Role of Efficiencies”	2002
Department of Justice Telecom Workshop “Stimulating Investment and the Telecommunications Act of 1996”	2002
Department of Commerce Conference on the State of the Telecom Sector “Stimulating Investment and the Telecommunications Act of 1996”	2002
Law and Public Affairs Conference on the Future of Internet Regulation “Open Access and Competition Policy Principles”	2002
Center for Economic Policy Studies Symposium on Energy Policy “The Future of Power Supply”	2002
The Conference Board: Antitrust Issues in Today’s Economy “The 1982 Merger Guidelines at 20”	2002
Federal Energy Regulatory Commission Workshop “Effective Deregulation of Residential Electric Service”	2001
IPEA International Seminar on Regulation and Competition “Electricity Markets: Deregulation of Residential Service” “Lessons for Brazil from Abroad”	2001 2001
ABA Antitrust Law Section Task Force Conference “Time, Change, and Materiality for Monopolization Analyses”	2001
Harvard University Conference on American Economic Policy in the 1990s “Comments on Antitrust Policy in the Clinton Administration”	2001
Tel-Aviv Workshop on Industrial Organization and Anti-Trust “The Risk of Contagion from Multimarket Contact”	2001

2001 Antitrust Conference	
“Collusion Cases: Cutting Edge or Over the Edge?”	2001
“Dys-regulation of California Electricity”	2001
FTC Public Workshop on Competition Policy for E-Commerce	
“Necessary Conditions for Cooperation to be Problematic”	2001
HIID International Workshop on Infrastructure Policy	
“Infrastructure Privatization and Regulation”	2000
Villa Mondragone International Economic Seminar	
“Competition Policy for Network and Internet Markets”	2000
New Developments in Railroad Economics: Infrastructure Investment and Access Policies	
“Railroad Access, Regulation, and Market Structure”	2000
The Multilateral Trading System at the Millennium	
“Efficiency Gains From Further Liberalization”	2000
Singapore – World Bank Symposium on Competition Law and Policy	
“Policy Towards Cartels and Collusion”	2000
CEPS: Is It a New World?: Economic Surprises of the Last Decade	
“The Internet and E-Commerce”	2000
Cutting Edge Antitrust: Issues and Enforcement Policies	
“The Direction of Antitrust Entering the New Millennium”	2000
The Conference Board: Antitrust Issues in Today’s Economy	
“Antitrust Analysis of Industries With Network Effects”	1999
CEPS: New Directions in Antitrust	
“Antitrust in a High-Tech World”	1999
World Bank Meeting on Competition and Regulatory Policies for Development	
“Economic Principles to Guide Post-Privatization Governance”	1999
1999 Antitrust Conference	
“Antitrust and the Pace of Technological Development”	1999
“Restructuring the Electric Utility Industry”	1999
HIID International Workshop on Privatization, Regulatory Reform and Corporate Governance	
“Privatization and Post-Privatization Regulation of Natural Monopolies”	1999

The Federalist Society: Telecommunications Deregulation: Promises Made, Potential Lost?	
“Grading the Regulators”	1999
Inter-American Development Bank: Second Generation Issues In the Reform Of Public Services	
“Post-Privatization Governance”	1999
“Issues Surrounding Access Arrangements”	1999
Economic Development Institute of the World Bank -- Program on Competition Policy	
“Policy Towards Horizontal Mergers”	1998
Twenty-fifth Anniversary Seminar for the Economic Analysis Group of the Department of Justice	
“Market Definition in Antitrust Analysis”	1998
HIID International Workshop on Privatization, Regulatory Reform and Corporate Governance	
“Infrastructure Architecture and Regulation: Railroads”	1998
EU Committee Competition Conference – Market Power	
“US/EC Perspective on Market Definition”	1998
Federal Trade Commission Roundtable	
“Antitrust Policy for Joint Ventures”	1998
1998 Antitrust Conference	
“Communications Mergers”	1998
The Progress and Freedom Foundation Conference on Competition, Convergence, and the Microsoft Monopoly	
Access and Bundling in High-Technology Markets	1998
FTC Program on The Effective Integration of Economic Analysis into Antitrust Litigation	
The Role of Economic Evidence and Testimony	1997
FTC Hearings on Classical Market Power in Joint Ventures	
Microeconomic Analysis and Guideline	1997
World Bank Economists --Week IV Keynote	
Making Markets More Effective With Competition Policy	1997
Brookings Trade Policy Forum	
Competition Policy and Antidumping: The Economic Effects	1997

University of Malaya and Harvard University Conference on The Impact of Globalisation and Privatisation on Malaysia and Asia in the Year 2020	
Microeconomics, Privatization, and Vertical Integration	1997
ABA Section of Antitrust Law Conference on The Telecommunications Industry	
Current Economic Issues in Telecommunications	1997
Antitrust 1998: The Annual Briefing	
The Re-Emergence of Distribution Issues	1997
Inter-American Development Bank Conference on Private Investment, Infrastructure Reform and Governance in Latin America & the Caribbean	
Economic Principles to Guide Post-Privatization Governance	1997
Harvard Forum on Regulatory Reform and Privatization of Telecommunications in the Middle East	
Privatization: Methods and Pricing Issues	1997
American Enterprise Institute for Public Policy Research Conference	
Discussion of Local Competition and Legal Culture	1997
Harvard Program on Global Reform and Privatization of Public Enterprises	
“Infrastructure Privatization and Regulation: Freight”	1997
World Bank Competition Policy Workshop	
“Competition Policy for Entrepreneurship and Growth”	1997
Eastern Economics Association Paul Samuelson Lecture	
“Bottleneck Access in Regulation and Competition Policy”	1997
ABA Annual Meeting, Section of Antitrust Law	
“Antitrust in the 21st Century: The Efficiencies Guidelines”	1997
Peruvian Ministry of Energy and Mines Conference on Regulation of Public Utilities	
“Regulation: Theoretical Context and Advantages vs. Disadvantages”	1997
The FCC: New Priorities and Future Directions	
“Competition in the Telecommunications Industry”	1997
American Enterprise Institute Studies in Telecommunications Deregulation	
“The Scope of Competition in Telecommunications”	1996
George Mason Law Review Symposium on Antitrust in the Information Revolution	
“Introduction to the Economic Theory of Antitrust and Information”	1996

Korean Telecommunications Public Lecture “Market Opening and Fair Competition”	1996
Korea Telecommunications Forum “Desirable Interconnection Policy in a Competitive Market”	1996
European Association for Research in Industrial Economics Annual Conference “Bottleneck Access: Regulation and Competition Policy”	1996
Harvard Program on Global Reform and Privatization of Public Enterprises “Railroad and Other Infrastructure Privatization”	1996
FCC Forum on Antitrust and Economic Issues Involved with InterLATA Entry “The Scope of Telecommunications Competition”	1996
Citizens for a Sound Economy Policy Watch on Telecommunications Interconnection “The Economics of Interconnection”	1996
World Bank Seminar on Experiences with Corporatization “Strategic Directions of Privatization”	1996
FCC Economic Forum on the Economics of Interconnection Lessons from Other Industries	1996
ABA Annual Meeting, Section of Antitrust Law The Integration, Disintegration, and Reintegration of the Entertainment Industry	1996
Conference Board: 1996 Antitrust Conference How Economics Influences Antitrust and Vice Versa	1996
Antitrust 1996: A Special Briefing Joint Ventures and Strategic Alliances	1996
New York State Bar Association Section of Antitrust Law Winter Meeting Commentary on Horizontal Effects Issues	1996
FTC Hearings on the Changing Nature of Competition in a Global and Innovation-Driven Age Vertical Issues for Networks and Standards	1995
Wharton Seminar on Applied Microeconomics Access Policies with Imperfect Regulation	1995

Antitrust 1996, Washington D.C. Assessing Joint Ventures for Diminution of Competition	1995
ABA Annual Meeting, Section of Antitrust Law Refusals to Deal -- Economic Tests for Competitive Harm	1995
FTC Seminar on Antitrust Enforcement Analysis Diagnosing Collusion Possibilities	1995
Philadelphia Bar Education Center: Antitrust Fundamentals Antitrust--The Underlying Economics	1995
Vanderbilt University Conference on Financial Markets Why Do Christie and Schultz Infer Collusion From Their Data?	1995
ABA Section of Antitrust Law Chair=s Showcase Program Discussion of Telecommunications Competition Policy	1995
Conference Board: 1995 Antitrust Conference Analysis of Mergers and Joint Ventures	1995
ABA Conference on The New Antitrust: Policy of the '90s Antitrust on the Super Highways/Super Airways	1994
ITC Hearings on The Economic Effects of Outstanding Title VII Orders "The Economic Impacts of Antidumping Policies"	1994
OECD Working Conference on Trade and Competition Policy "Empirical Evidence on The Nature of Anti-dumping Actions"	1994
Antitrust 1995, Washington D.C. "Rigorous Antitrust Standards for Distribution Arrangements"	1994
ABA -- Georgetown Law Center: Post Chicago-Economics: New Theories - New Cases? "Economic Foundations for Vertical Merger Guidelines"	1994
Conference Board: Antitrust Issues in Today's Economy "New Democrats, Old Agencies: Competition Law and Policy"	1994
Federal Reserve Board Distinguished Economist Series "Regulated Private Enterprise Versus Public Enterprise"	1994
Institut d'Etudes Politiques de Paris "Lectures on Competition Policy and Privatization"	1993

Canadian Bureau of Competition Policy Academic Seminar Series, Toronto. "Public Versus Regulated Private Enterprise"	1993
CEPS Symposium on The Clinton Administration: A Preliminary Report Card "Policy Towards Business"	1993
Columbia Institute for Tele-Information Conference on Competition in Network Industries, New York, NY "Discussion of Deregulation of Networks: What Has Worked and What Hasn't"	1993
World Bank Annual Conference on Development Economics "Public Versus Regulated Private Enterprise"	1993
Center for Public Utilities Conference on Current Issues Challenging the Regulatory Process "The Economics of Current Issues in Telecommunications Regulation"	1992
"The Role of Markets in Presently Regulated Industries"	1992
The Conference Board's Conference on Antitrust Issues in Today's Economy, New York, NY "Antitrust in the Global Economy"	1992
"Monopoly Issues for the '90s"	1993
Columbia University Seminar on Applied Economic Theory, New York, NY "Economic Rationales for the Scope of Privatization"	1992
Howrey & Simon Conference on Antitrust Developments, Washington, DC "Competitive Effects of Concern in the Merger Guidelines"	1992
Arnold & Porter Colloquium on Merger Enforcement, Washington, DC "The Economic Foundations of the Merger Guidelines"	1992
American Bar Association, Section on Antitrust Law Leadership Council Conference, Monterey, CA "Applying the 1992 Merger Guidelines"	1992
OECD Competition Policy Meeting, Paris, France "The Economic Impacts of Antidumping Policy"	1992
Center for Public Choice Lecture Series, George Mason University Arlington, VA "The Economic Impacts of Antidumping Policy"	1992
Brookings Institution Microeconomics Panel, Washington, DC, "Discussion of the Evolution of Industry Structure"	1992
AT&T Conference on Antitrust Essentials	

"Antitrust Standards for Mergers and Joint Ventures"	1991
ABA Institute on The Cutting Edge of Antitrust: Market Power "Assessing and Proving Market Power: Barriers to Entry"	1991
Second Annual Workshop of the Competition Law and Policy Institute of New Zealand "Merger Analysis, Industrial Organization Theory, and Merger Guidelines"	1991
"Exclusive Dealing and the <u>Fisher & Paykel</u> Case"	1991
Special Seminar of the New Zealand Treasury "Strategic Behavior, Antitrust, and The Regulation of Natural Monopoly"	1991
Public Seminar of the Australian Trade Practices Commission "Antitrust Issues of the 1990's"	1991
National Association of Attorneys General Antitrust Seminar "Antitrust Economics"	1991
District of Columbia Bar's 1991 Annual Convention "Administrative and Judicial Trends in Federal Antitrust Enforcement"	1991
ABA Spring Meeting "Antitrust Lessons From the Airline Industry"	1991
Conference on The Transition to a Market Economy - Institutional Aspects "Anti-Monopoly Policies and Institutions"	1991
Conference Board's Thirtieth Antitrust Conference "Antitrust Issues in Today's Economy"	1991
American Association for the Advancement of Science Annual Meeting "Methodologies for Economic Analysis of Mergers"	1991
General Seminar, Johns Hopkins University "Economic Rationales for the Scope of Privatization"	1991
Capitol Economics Speakers Series "Economics of Merger Guidelines"	1991
CRA Conference on Antitrust Issues in Regulated Industries "Enforcement Priorities and Economic Principles"	1990
Pepper Hamilton & Scheetz Anniversary Colloquium "New Developments in Antitrust Economics"	1990

PLI Program on Federal Antitrust Enforcement in the 90's "The Antitrust Agenda of the 90's"	1990
FTC Distinguished Speakers Seminar "The Evolving Merger Guidelines"	1990
The World Bank Speakers Series "The Role of Antitrust Policy in an Open Economy"	1990
Seminar of the Secretary of Commerce and Industrial Development of Mexico "Transitions to a Market Economy"	1990
Southern Economics Association "Entry in Antitrust Analysis of Mergers"	1990
"Discussion of Strategic Investment and Timing of Entry"	1990
American Enterprise Institute Conference on Policy Approaches to the Deregulation of Network Industries "Discussion of Network Problems and Solutions"	1990
American Enterprise Institute Conference on Innovation, Intellectual Property, and World Competition "Law and Economics Framework for Analysis"	1990
Banco Nacional de Desenvolvimento Economico Social Lecture "Competition Policy: Harnessing Private Interests for the Public Interest"	1990
Western Economics Association Annual Meetings "New Directions in Antitrust from a New Administration"	1990
"New Directions in Merger Enforcement: The View from Washington"	1990
Woodrow Wilson School Alumni Colloquium "Microeconomic Policy Analysis and Antitrust--Washington 1990"	1990
Arnold & Porter Lecture Series "Advocating Competition"	1991
"Antitrust Enforcement"	1990
ABA Antitrust Section Convention "Recent Developments in Market Definition and Merger Analysis"	1990
Federal Bar Association "Joint Production Legislation: Competitive Necessity or Cartel Shield?"	1990
Pew Charitable Trusts Conference	

"Economics and National Security"	1990
ABA Antitrust Section Midwinter Council Meeting	
"Fine-tuning the Merger Guidelines"	1990
"The State of the Antitrust Division"	1991
International Telecommunications Society Conference	
"Discussion of the Impact of Telecommunications in the UK"	1989
The Economists of New Jersey Conference	
"Recent Perspectives on Regulation"	1989
Conference on Current Issues Challenging the Regulatory Process	
"Innovative Pricing and Regulatory Reform"	1989
"Competitive Wheeling"	1989
Conference Board: Antitrust Issues in Today's Economy	
"Foreign Trade Issues and Antitrust"	1989
McKinsey & Co. Mini-MBA Conference	
"Economic Analysis of Pricing, Costing, and Strategic Business Behavior"	1989
	1994
Olin Conference on Regulatory Mechanism Design	
"Revolutions in Regulatory Theory and Practice: Exploring The Gap"	1989
University of Dundee Conference on Industrial Organization and Strategic Behavior	
"Mergers in Differentiated Product Industries"	1988
Leif Johanson Lectures at the University of Oslo	
"Normative Issues in Industrial Organization"	1988
Mergers and Competitiveness: Spain Facing the EEC	
"Merger Policy"	1988
"R&D Joint Ventures"	1988
New Dimensions in Pricing Electricity	
"Competitive Pricing and Regulatory Reform"	1988
Program for Integrating Economics and National Security: Second Annual Colloquium	
"Arming Decisions Under Asymmetric Information"	1988
European Association for Research in Industrial Economics	
"U.S. Railroad Deregulation and the Public Interest"	1987
"Economic Rationales for the Scope of Privatization"	1989

"Discussion of Licensing of Innovations"	1990
Annenberg Conference on Rate of Return Regulation in the Presence of Rapid Technical Change	
"Discussion of Regulatory Mechanism Design in the Presence of Research, Innovation, and Spillover Effects"	1987
Special Brookings Papers Meeting	
"Discussion of Empirical Approaches to Strategic Behavior"	1987
"New Merger Guidelines"	1990
Deregulation or Regulation for Telecommunications in the 1990's	
"How Effective are State and Federal Regulations?"	1987
Conference Board Roundtable on Antitrust	
"Research and Production Joint Ventures"	1990
"Intellectual Property and Antitrust"	1987
Current Issues in Telephone Regulation	
"Economic Approaches to Market Dominance: Applicability of Contestable Markets"	1987
Harvard Business School Forum on Telecommunications	
"Regulation of Information Services"	1987
The Fowler Challenge: Deregulation and Competition in The Local Telecommunications Market	
"Why Reinvent the Wheel?"	1986
World Bank Seminar on Frontiers of Economics	
"What Every Economist Should Know About Contestable Markets"	1986
Bell Communications Research Conference on Regulation and Information	
"Fuzzy Regulatory Rules"	1986
Karl Eller Center Forum on Telecommunications	
"The Changing Economic Environment in Telecommunications: Technological Change and Deregulation"	1986
Railroad Accounting Principles Board Colloquium	
"Contestable Market Theory and ICC Regulation"	1986
Canadian Embassy Conference on Current Issues in Canadian -- U.S. Trade and Investment	
"Regulatory Revolution in the Infrastructure Industries"	1985
Eagleton Institute Conference on Telecommunications in Transition	
"Industry in Transition: Economic and Public Policy Overview"	1985

Brown University Citicorp Lecture "Logic of Regulation and Deregulation"	1985
Columbia University Communications Research Forum "Long Distance Competition Policy"	1985
American Enterprise Institute Public Policy Week "The Political Economy of Regulatory Reform"	1984
MIT Communications Forum "Deregulation of AT&T Communications"	1984
Bureau of Census Longitudinal Establishment Data File and Diversification Study Conference "Potential Uses of The File"	1984
Federal Bar Association Symposium on Joint Ventures "The Economics of Joint Venture Assessment"	1984
Hoover Institute Conference on Antitrust "Antitrust for High-Technology Industries"	1984
NSF Workshop on Predation and Industrial Targeting "Current Economic Analysis of Predatory Practices"	1983
The Institute for Study of Regulation Symposium: Pricing Electric, Gas, and Telecommunications Services Today and for the Future "Contestability As A Guide for Regulation and Deregulation"	1984
University of Pennsylvania Economics Day Symposium "Contestability and Competition: Guides for Regulation and Deregulation"	1984
Pinhas Sapir Conference on Economic Policy in Theory and Practice "Corporate Governance and Market Structure"	1984
Centre of Planning and Economic Research of Greece "Issues About Industrial Deregulation"	1984
	1984
Hebrew and Tel Aviv Universities Conference on Public Economics "Social Welfare Dominance Extended and Applied to Excise Taxation"	1983
NBER Conference on Industrial Organization and International Trade "Perspectives on Horizontal Mergers in World Markets"	1983

Workshop on Local Access: Strategies for Public Policy	
"Market Structure and Government Intervention in Access Markets"	1982
NBER Conference on Strategic Behavior and International Trade	
"Industrial Strategy with Committed Firms: Discussion"	1982
Columbia University Graduate School of Business, Conference on Regulation and New Telecommunication Networks	
"Local Pricing in a Competitive Environment"	1982
International Economic Association Roundtable Conference on New Developments in the Theory of Market Structure	
"Theory of Contestability"	1982
"Product Dev., Investment, and the Evolution of Market Structures"	1982
N.Y.U. Conference on Competition and World Markets: Law and Economics	
"Competition and Trade Policy--International Predation"	1982
CNRS-ISPE-NBER Conference on the Taxation of Capital	
"Welfare Effects of Investment Under Imperfect Competition"	1982
Internationales Institut fur Management und Verwaltung Regulation Conference	
"Welfare, Regulatory Boundaries, and the Sustainability of Oligopolies"	1981
NBER-Kellogg Graduate School of Management Conference on the Econometrics of Market Models with Imperfect Competition	
"Discussion of Measurement of Monopoly Behavior: An Application to the Cigarette Industry"	1981
The Peterkin Lecture at Rice University	
"Deregulation: Ideology or Logic?"	1981
FTC Seminar on Antitrust Analysis	
"Viewpoints on Horizontal Mergers"	1982
"Predation as a Tactical Inducement for Exit"	1980
NBER Conference on Industrial Organization and Public Policy	
"An Economic Definition of Predation"	1980
The Center for Advanced Studies in Managerial Economics Conference on The Economics of Telecommunication	
"Pricing Local Service as an Input"	1980
Aspen Institute Conference on the Future of the Postal Service	
"Welfare Economics of Postal Pricing"	1979

Department of Justice Antitrust Seminar "The Industry Performance Gradient Index"	1979
Eastern Economic Association Convention "The Social Performance of Deregulated Markets for Telecom Services" 1979	
Industry Workshop Association Convention "Customer Equity and Local Measured Service"	1979
Symposium on Ratemaking Problems of Regulated Industries "Pricing Decisions and the Regulatory Process"	1979
Woodrow Wilson School Alumni Conference "The Push for Deregulation"	1979
NBER Conference on Industrial Organization "Intertemporal Sustainability"	1979
World Congress of the Econometric Society "Theoretical Industrial Organization"	1980
Institute of Public Utilities Conference on Current Issues in Public Utilities Regulation "Network Access Pricing"	1978
ALI-ABA Conference on the Economics of Antitrust "Predatoriness and Discriminatory Pricing"	1978
AEI Conference on Postal Service Issues "What Can Markets Control?"	1978
University of Virginia Conference on the Economics of Regulation "Public Interest Pricing"	1978
DRI Utility Conference "Marginal Cost Pricing in the Utility Industry: Impact and Analysis"	1978
International Meeting of the Institute of Management Sciences "The Envelope Theorem"	1977
University of Warwick Workshop on Oligopoly "Industry Performance Gradient Indexes"	1977
North American Econometric Society Convention "Intertemporal Sustainability"	1979
"Social Welfare Dominance"	1978

"Economies of Scope, DAIC, and Markets with Joint Production"	1977
Telecommunications Policy Research Conference	
"Transition to Competitive Markets"	1986
"InterLATA Capacity Growth, Capped NTS Charges and Long Distance Competition"	1985
"Market Power in The Telecommunications Industry"	1984
"FCC Policy on Local Access Pricing"	1983
"Do We Need a Regulatory Safety Net in Telecommunications?"	1982
"Anticompetitive Vertical Conduct"	1981
"Electronic Mail and Postal Pricing"	1980
"Monopoly, Competition and Efficiency": Chairman	1979
"A Common Carrier Research Agenda"	1978
"Empirical Views of Ramsey Optimal Telephone Pricing"	1977
"Recent Research on Regulated Market Structure"	1976
"Some General Equilibrium Views of Optimal Pricing"	1975
National Bureau of Economic Research Conference on Theoretical Industrial Organization	
"Compensating Variation as a Measure of Welfare Change"	1976
Conference on Pricing in Regulated Industries: Theory & Application	
"Ramsey Optimal Pricing of Long Distance Telephone Services"	1977
NBER Conference on Public Regulation	
"Income Distributional Concerns in Regulatory Policy-Making"	1977
Allied Social Science Associations National Convention	
"Merger Guidelines and Economic Theory"	1990
Discussion of "Competitive Rules for Joint Ventures"	1989
"New Schools in Industrial Organization"	1988
"Industry Economic Analysis in the Legal Arena"	1987
"Transportation Deregulation"	1984
Discussion of "Pricing and Costing of Telecommunications Services"	1983
Discussion of "An Exact Welfare Measure"	1982
"Optimal Deregulation of Telephone Services"	1982
"Sector Differentiated Capital Taxes"	1981
"Economies of Scope"	1980
"Social Welfare Dominance"	1980
"The Economic Definition of Predation"	1979
Discussion of "Lifeline Rates, Succor or Snare?"	1979
"Multiproduct Technology and Market Structure"	1978
"The Economic Gradient Method"	1978
"Methods for Public Interest Pricing"	1977
Discussion of "The Welfare Implications of New Financial Instruments"	1976
"Welfare Theory of Concentration Indices"	1976
Discussion of "Developments in Monopolistic Competition Theory"	1976

"Hedonic Price Adjustments"	1975
"Public Good Attributes of Information and its Optimal Pricing"	1975
"Risk Invariance and Ordinally Additive Utility Functions"	1974
"Consumer's Surplus: A Rigorous Cookbook"	1974
University of Chicago Symposium on the Economics of Regulated Public Utilities	
"Optimal Prices for Public Purposes"	1976
American Society for Information Science	
"The Social Value of Information: An Economist's View"	1975
Institute for Mathematical Studies in the Social Sciences Summer Seminar	
"The Sustainability of Natural Monopoly"	1975
U.S.-U.S.S.R. Symposium on Estimating Costs and Benefits of Information Services	
"The Evaluation of the Economic Benefits of Productive Information"	1975
NYU-Columbia Symposium on Regulated Industries	
"Ramsey Optimal Public Utility Pricing"	1975

Research Seminars:

Bell Communications Research (2)	University of California, San Diego
Bell Laboratories (numerous)	University of Chicago
Department of Justice (3)	University of Delaware
Electric Power Research Institute	University of Florida
Federal Reserve Board	University of Illinois
Federal Trade Commission (4)	University of Iowa (2)
Mathematica	Universite Laval
Rand	University of Maryland
World Bank (3)	University of Michigan
Carleton University	University of Minnesota
Carnegie-Mellon University	University of Oslo
Columbia University (4)	University of Pennsylvania (3)
Cornell University (2)	University of Toronto
Georgetown University	University of Virginia
Harvard University (2)	University of Wisconsin

Hebrew University

Johns Hopkins University (2)

M. I. T. (4)

New York University (4)

Northwestern University (2)

Norwegian School of Economics and
Business Administration

University of Wyoming

Vanderbilt University

Yale University (2)

Princeton University (many)

Rice University

Stanford University (5)

S.U.N.Y. Albany

Attachment 2:
Robert Willig Expert Testimony Provided in the Last Four Years

1. In the Matter of Verizon New Jersey, Inc. – Resolution for Assistance Resolving Interconnection Negotiations with US Cable of Paramus/Hillsdale, Time Warner Cable, Cablevision, and Comcast; Before the State of New Jersey Office of Board of Public Utilities, Docket No. CO07070524; Expert Report 4/21/2008; Testimony 5/12/2008.
2. New England Carpenters Health Benefits Fund et al.v. First Databank, Inc., and McKesson Corp. In the United States District Court for the District of Massachusetts, Civil Action: 1:05-CV-11148-PBS, Expert Report 1/24/2007; Rebuttal Expert Declaration 5/07/2007; Expert Declaration 10/15/2007; Rebuttal Expert Declaration 11/08/2007; Expert Declaration 11/28/2007. Expert Declaration 5/21/08. Expert Report 10/1/08.
3. AT&T and Centennial; Before the Federal Communications Commission; WT Docket No. 08-246; Expert Report 11/20/2008.
4. In the Matter of Lisa Reed and Cindy Digiannantonio v. Advocate Health Care, et al. In the Northern District of Illinois Eastern Division, Civil Action No. 06 C 3337; Expert Report 1/20/2009; Supplemental 2/27/2009; Deposition Testimony 3/23/2009-3/24/2009.
5. In the matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless Including Commercial Mobile Services; Before the Federal Communications Commission; WT Docket No. 09-66; Declaration, 9/30/09.
6. Cindy Cullen, Wendy Fleishman, on Behalf of Themselves and All Others Similarly Situated v. Albany Medical Center, Ellis Hospital, Northeast Health, Seton Health System, and St. Peter's Health Care Service, In the United States District Court for the Northern District of New York, Civil Action No. 06-CV-0765/ TJM/ DRH; Expert Report 2/29/2008; Deposition 3/27-28/2008; Expert Report 9/4/2009; Deposition 11/19-20/2009, Declaration 12/28/2009.
7. In the Australian Competition Tribunal: Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 23 May 2006 under Section 44H(9) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Mount Newman Railway Line, By: Fortescue Metals Group Limited; Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 27 October 2008 under Section 44H(1) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Robe RailwayBy: Robe River Mining Co PTY LTD & ORS; Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 27

October 2008 under Section 44H(1) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Hamersley Rail Network, By: Hamersley Iron Co PTY LTD & ORS; Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 27 October 2008 under Section 44H(1) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Goldsworthy Railway, By: BHP Billiton Iron Ore PTY LTD and BHP Billiton Minerals PTY LTD; Expert Report 6/30/2009 and 9/18/2009, Trial Testimony 11/2/2009-11/6/2009.

8. Stagecoach Group PLC and Coach USA, Inc., et al, Acquisition of Control, Twin America, LLC, Before the Surface Transportation Board, Verified Statement of Professor Robert D. Willig, Submitted November 17, 2009.
9. In re: Rail Freight Fuel Surcharge Antitrust Litigation, In the United States District Court for the District of Columbia, MDL Docket No. 1869, Misc. No. 07-489 (PLF), Expert Report, 8/1/2010, deposition 8/4/2010
10. Before the Federal Reserve Bank: Docket Number R-1404: Proposed Rule on Debit Card Interchange Fees and Routing, written statement 2/22/2011.
11. Before the Surface Transportation Board: Docket Number EP 704: Review of Commodity, Boxcar, and TOFC/COFC Exemptions; written statement 1/31/2011; testimony at hearing 2/23, 24/2011.
12. New Zealand Commerce Commission vs. Malaysian Airline Systems Berhad, Ltd. and et. al.; High Court of New Zealand: CV 2008-404-8350, Brief of Evidence 4/28/2011, Trial testimony 5/20/11 and 5/23-27/2011.
13. Before the Federal Communications Commission: Docket Number 11-65: For Consent to Assign or Transfer Control Licenses and Authorization, written reply statement 6/9/2011.
14. In Re: Checking Account Overdraft Litigation, MDL No. 2036 In the United States District Court for the Southern District of Florida, Miami Division, Case No. 09-MD-02036-JLK, Luquetta v. JPMorgan Chase Bank, Declaration In Support of JP Morgan Chase Bank, N.A.'s Opposition to Class Certification, June 16, 2011.
15. Before the Surface Transportation Board: Docket Number EP 705: Competition in the Rail Industry, written statement 4/12/2011, written reply statement 5/27/2011, testimony at hearing 6/22, 23/2011.
16. In the Matter of Rambus Inc. v. Micron Technology, Inc., et al. In the Superior Court of the State of California County of San Francisco, Civil Action No. 04-431105; Expert Report 11/08/2008; Supplemental Expert Report 12/19/2008, Deposition Testimony 5/7/2009-5/8/2009, Trial testimony 9/1,6,7/2011.

17. In Re McKesson Governmental Entities Average Wholesale Price Litigation, Master File No.: 1:08-CV-10843-PBS; The Board of County Commissioners of Douglas County, Kansas et al. v. McKesson Corp., Expert Report, April 14, 2010, Response Report, June 28, 2010; Related to Connecticut v. McKesson Corp., Expert Report, April 14, 2010; Related to Montana v. McKesson Corporation, Expert Report, November 8, 2010; Related to Oklahoma v. McKesson Corporation, Expert Report, November 8, 2010; San Francisco Health Plan, et al. v. McKesson Corporation, Rebuttal Expert Report, September 19, 2011.
18. Before the Public Service Commission of Maryland, Case No.: 9271, In the Matter of the Merger of Exelon Corp. and Constellation Energy Group, Inc., written Market Power Rebuttal Testimony, 10/17/2011, written Surrebuttal Testimony, 10/26/2011, Hearing testimony, 11/2011.
19. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, DELL Inc., *et al.*, v. SHARP Corporation, *et al.*, Case No. 3:10-cv-01064 SI MDL No. 3:07-md-1827-SI, expert report, 2/23/2012, deposition, 4/18/2012.
20. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, Motorola Mobility Inc. v. SHARP Corporation, *et al.*, Case No. 3:09-cv-05840SI MDL No. 3:07-md-1827-SI, expert report, 2/23/2012, deposition, 4/18/2012.
21. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, AT&T Mobility Inc. v. SHARP Corporation, *et al.*, Case No. 09-cv-4997 SI MDL No. 07-m-1827-SI, expert report, 2/27/2012, deposition, 4/18/2012.
22. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, BEST BUY CO., Inc., *et al.*, v. AU OPTRONICS CORP., *et al.*, Case No. 10-cv-4572 SI MDL No. 07-md-1827-SI, expert report, 3/5/2012, deposition, 4/18/2012.
23. Clark R. Huffman and Brandi K. Winters, individually and on behalf of all others similarly situated vs. PRUDENTIAL INSURANCE COMPANY of AMERICA, In the United States District Court for the Eastern District of Pennsylvania, Civ. No. 2:10-cv-05135-EL, declaration, 4/10/2012.
24. In re Prudential Insurance Company of America SGLI/VGLI Contract Litigation, CLASS ACTION, Master Case No. 3:11-md-02208-MAP, In the United States District Court for the District of Massachusetts, declaration, 5/10/2012.
25. Australian Competition and Consumer Commission v. Singapore Airlines Cargo PTE LTD et. al., Before the Federal Court of Australia, District

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26. Bandspeed, Inc. v. Sony Electronics, Inc. et al. and Cambridge Silicon Radio Limited, Cause No. A-11-CV-771-LY, in the United States District Court for the Western District of Texas, Austin Division, expert report, 9/21/2012.
27. National Collegiate Athletic Association et al., Plaintiffs, v. Christopher J. Christie et al., Defendants, in the United States District Court for the District of New Jersey, Civil Action No. 3:12-cv-04947 (MAS) (LHG), Expert Report 11/21/2012, Deposition 11/30/2012.

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Attachment 3: Materials Relied Upon by Robert D. Willig

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Compucom Systems, Inc. et al. Complaint, November 14, 2011

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Indirect Purchaser Plaintiffs' Consolidated Amended Complaint, March 16, 2009

Interbond Corporation of America Complaint, November 14, 2011

Office Depot, Inc. Complaint, November 14, 2011

P.C. Richard & Son Long Island Corporation et al. Complaint, November 14, 2011

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Depositions and Exhibits

Deposition of Brian R. Stone, Best Buy, December 3, 2012

Deposition of Edwin Wolff, PNA, July 18, 2012

Deposition of Geoffrey Shavey, Costco, December 7, 2012

Deposition of Hirokazu Nishiyama, Panasonic & MTPD, July 17-18, 2012

Deposition of Jaein Lee, SDI, June 6-7, 2012

Deposition of Janet Netz, Panasonic & MTPD, November 15, 2012

Deposition of Jay Heinecke, TAEC, July 31, 2012

Deposition of Koji Kurosawa, Toshiba, July 30, 2012

Deposition of L. Thomas Heiser, HEDUS, July 3, 2012

Deposition of Masahiro Kimura, PAVCA, July 17, 2012

Deposition of Nobuhiko Kobayashi, Hitachi, July 17, 2012

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Deposition of Takashi Nakano, Panasonic & MTPD, July 13, 2012

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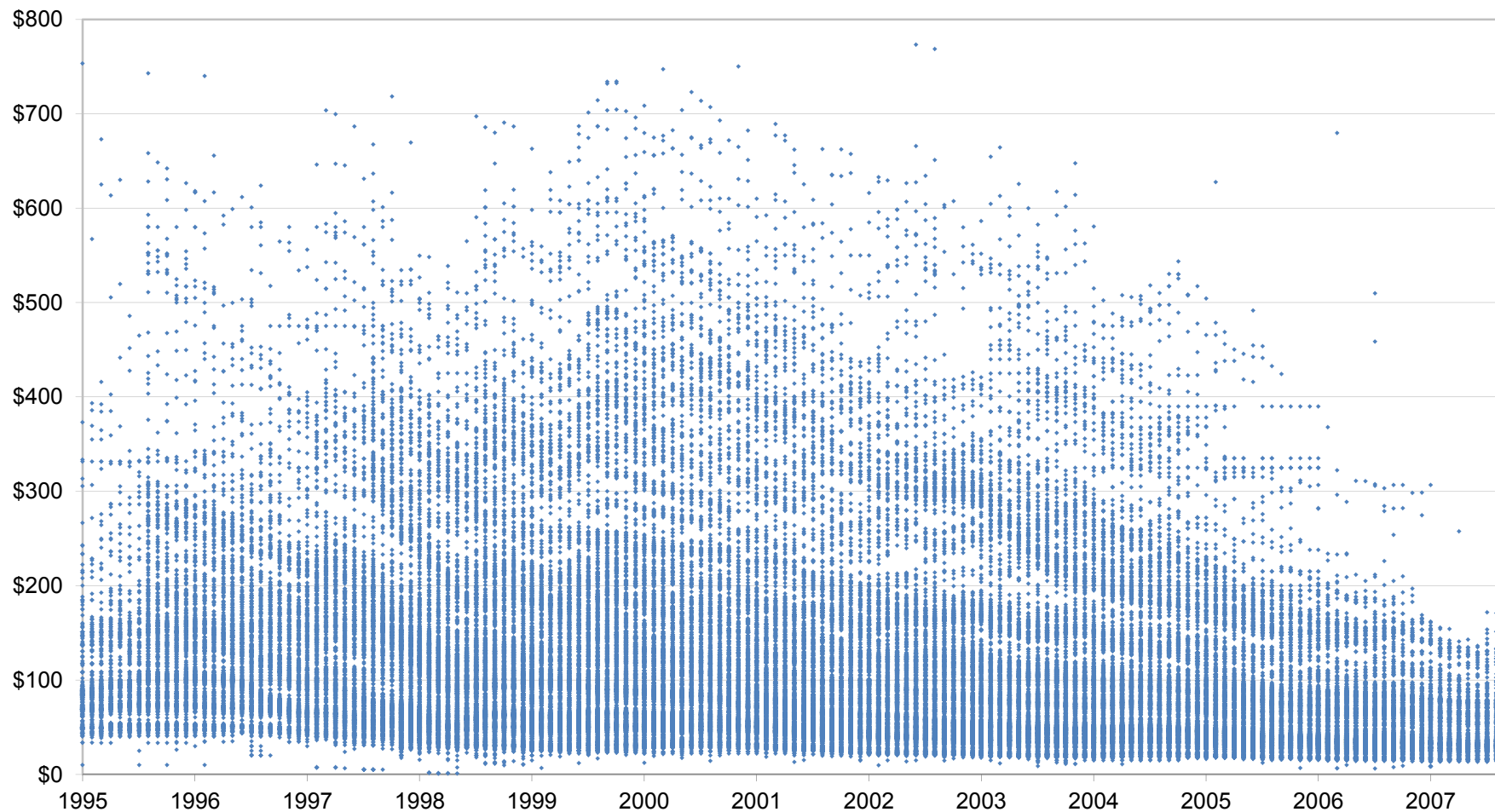
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MTPD-0607598	SDCRT-0087667
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SDCRT-0068880 - SDCRT-0069081	SDCRT-0088732
SDCRT-0086416	SDCRT-0088773
SDCRT-0086434	SDCRT-0090197
SDCRT-0086449	SDCRT-0091353
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SDCRT-0086563	SDCRT-0091372
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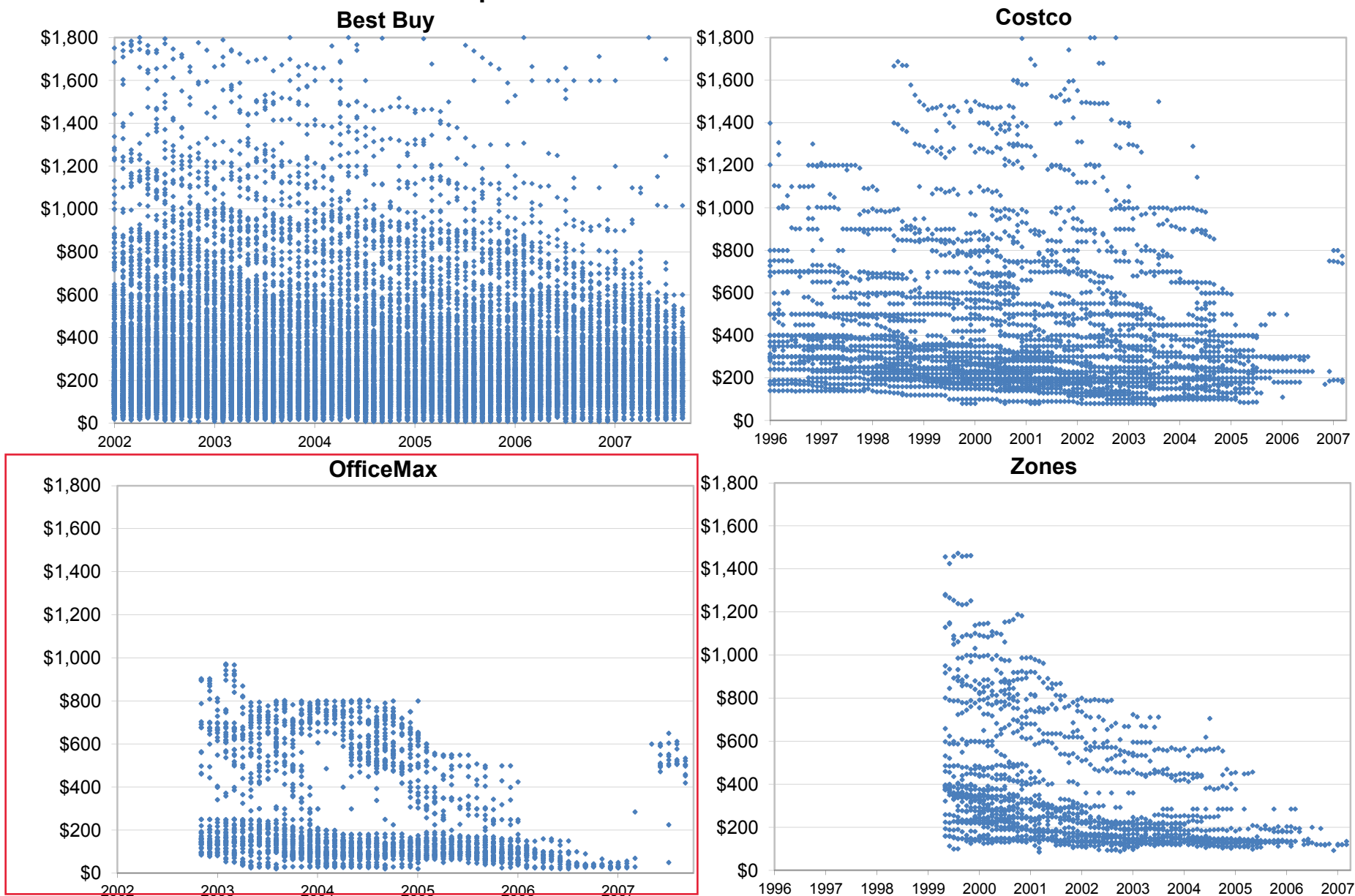
Exhibit 1A: Dispersion in Monthly Prices Across All CRT Models and All Customers



Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes: (1) Each observation represents the volume-weighted average price at which a specific CRT model was sold to a specific customer in a specific month; (2) A *de minimis* number of observations are outside the bounds of the y-axis; (3) Sales between integrated entities that sold CRTs were excluded.

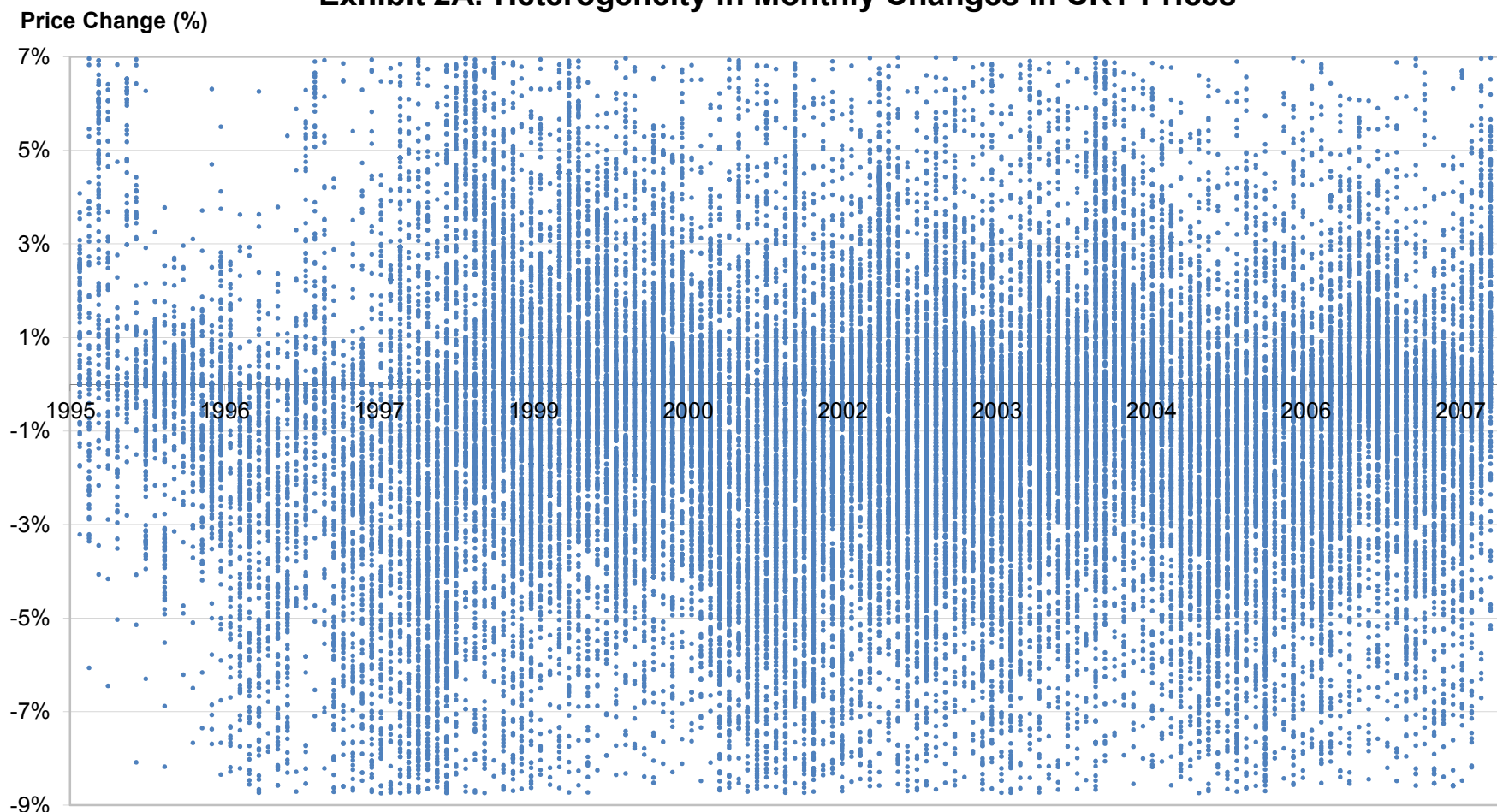
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Exhibit 1B: Dispersion in Retail Prices of CRT Finished Products

Sources: Retailer CRT Finished Product Sales data for Best Buy, Costco, OfficeMax, and Zones.

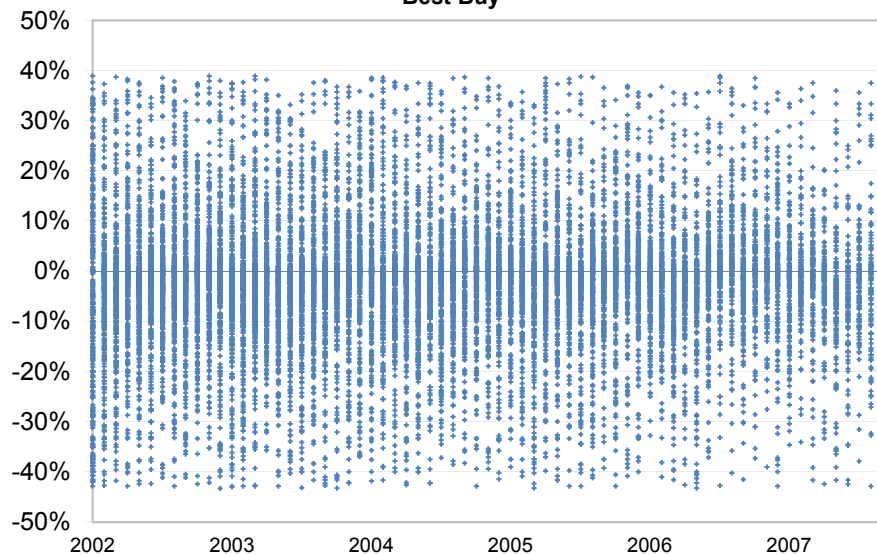
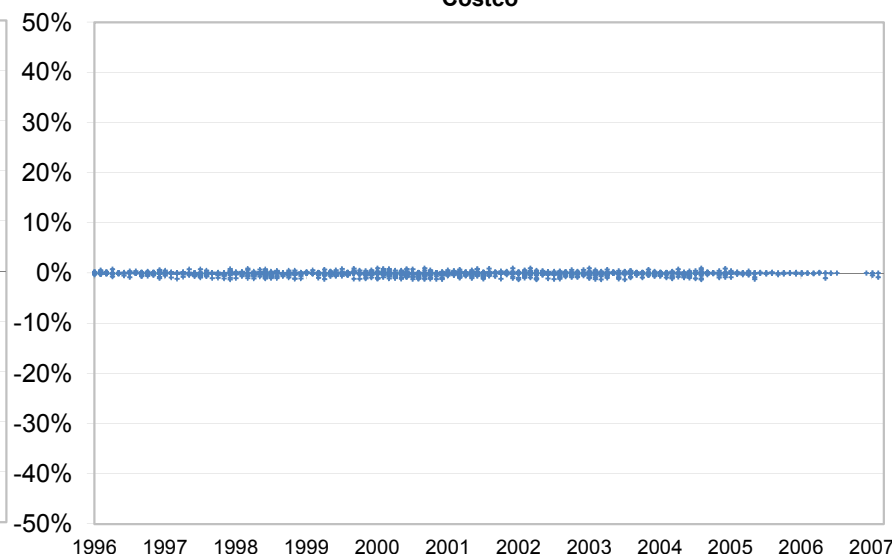
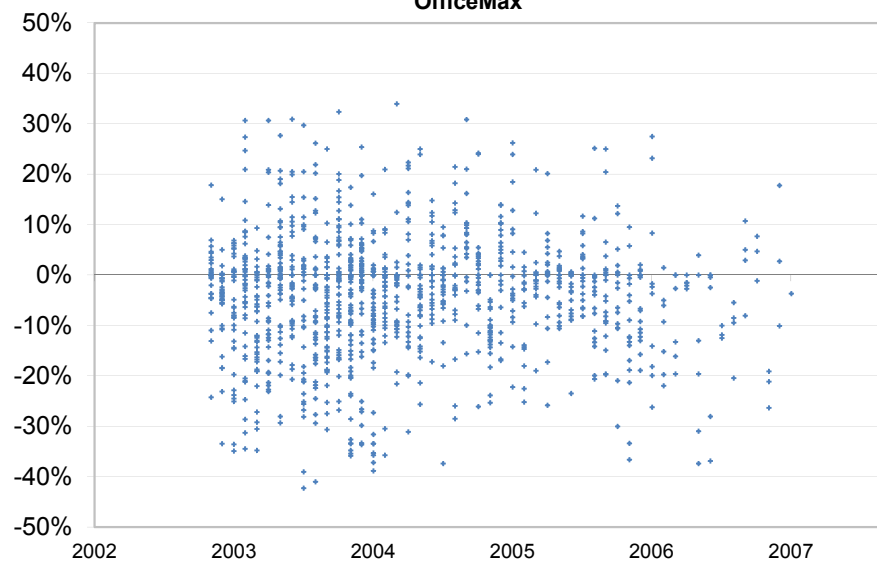
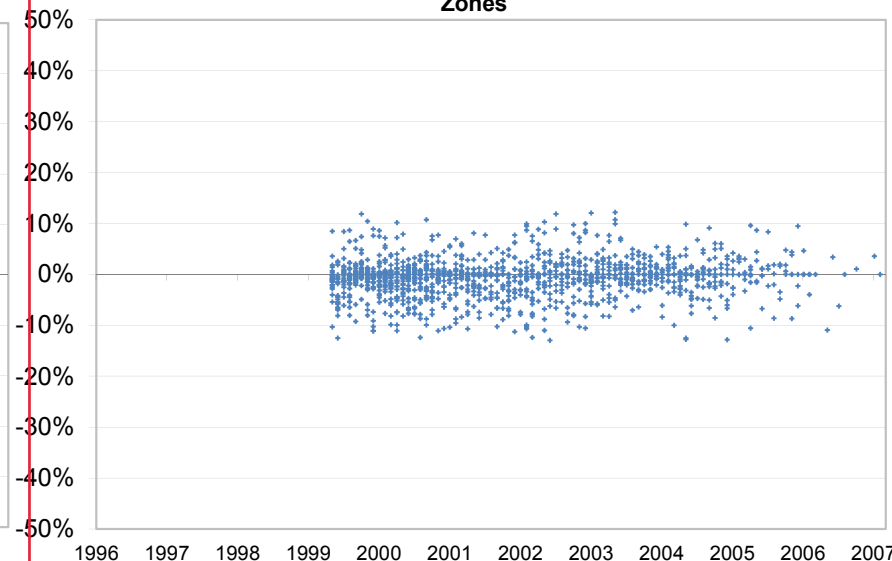
Notes: (1) Each observation represents the volume-weighted average price at which a specific CRT finished product model was sold in a specific month; (2) A *de minimis* number of observations are outside the bounds of the y-axis; (3) OfficeMax and Zones charts include prices for "bundled" desktop computer products.

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Exhibit 2A: Heterogeneity in Monthly Changes in CRT Prices

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes: (1) A point on the above chart represents the month-to-month price change for a given CRT model sold to a given customer over two consecutive months; (2) Observations for which the model number or customer name were missing were excluded; (3) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range; (4) Sales between integrated entities that sold CRTs were excluded; (5) A *de minimis* number of observations are outside the bounds of the y-axis.

Exhibit 2B: Heterogeneity of Changes in Finished CRT Retail Prices**Best Buy****Costco****OfficeMax****Zones**

Source: Retailer CRT Finished Product sales data for Best Buy, Costco, OfficeMax, and Zones.

Notes: (1) A point on the above chart represents the month-to-month price change for a given CRT finished product model; (2) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes for a given retailer minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range.

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Exhibit 3A: Heterogeneity of CRT Price Movements by Application, CPT Size, and CPT Shape

	Category 1	Category 2	Fraction of Prices of CRTs in Category 2 that Changed in the Opposite Direction to the Change in the Fisher Price Index for Category 1	Fraction of Prices of CRTs in Category 2 that Did Not Change Despite Change in the Fisher Price Index for Category 1	Sum of the Previous Two Columns
Differences Across Categories	CDT	CPT	19%	28%	48%
	CPT	CDT	24%	12%	36%
	Flat	Curved	29%	19%	48%
	Curved	Flat	21%	18%	39%
	Small	Large	23%	16%	39%
	Large	Small	21%	33%	54%
	Large	Medium	23%	25%	48%
	Medium	Large	16%	19%	35%
Differences Within Categories	CDT	CDT	10%	7%	17%
	CPT	CPT	17%	22%	39%
	Flat	Flat	16%	18%	34%
	Curved	Curved	19%	18%	36%
	Small	Small	12%	19%	31%
	Medium	Medium	18%	20%	38%
	Large	Large	12%	17%	28%

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba

Notes:

(1) The Global CRT Sales Data range from 3/1995-11/2007;

(2) Global sales data were used;

(3) A price observation in this analysis represents the change in the volume-weighted average price at which a specific CRT model was sold to a specific customer between two specific months;

(4) The month-to-month change in the Fisher Price Index for CPTs (for example) represents an average across all CPT models and customers of the changes in the prices paid by each customer for each model; the price changes across months one and two are averaged in two ways - once using the month one sales volumes and once using the month two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes;

(5) The fractions reported in the table were calculated as follows:

- Step 1: The 25% of months that saw the largest absolute month-to-month changes in the Fisher Price Index for CRTs in Category 1 were identified;

- Step 2: For each month identified in Step 1, (a) the fraction of prices of CRTs in Category 2 (weighted by sales volume) that changed in the opposite direction of the Category 1 Fisher Price Index and (b) the fraction whose prices did not change at all during the same time period were then estimated;

- Step 3: These fractions were averaged across all months identified in Step 1 using the sales volumes (by model, customer, and month) of CRTs in Category 2 as weights;

(6) A Category 2 CRT price observation was considered not to have changed between two consecutive months if the change in its volume-weighted average price was less than 1 cent;

(7) The Flat/Curved and Small/Medium/Large categories refer to CPTs only. The size categories are defined as follows: Small (0-19"), Medium (20-29"), Large (30+");

(8) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range;

(9) Sales between integrated entities that sold CRTs were excluded.

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Exhibit 3B: Heterogeneity of CRT Finished Product Price Movements by Application and Size

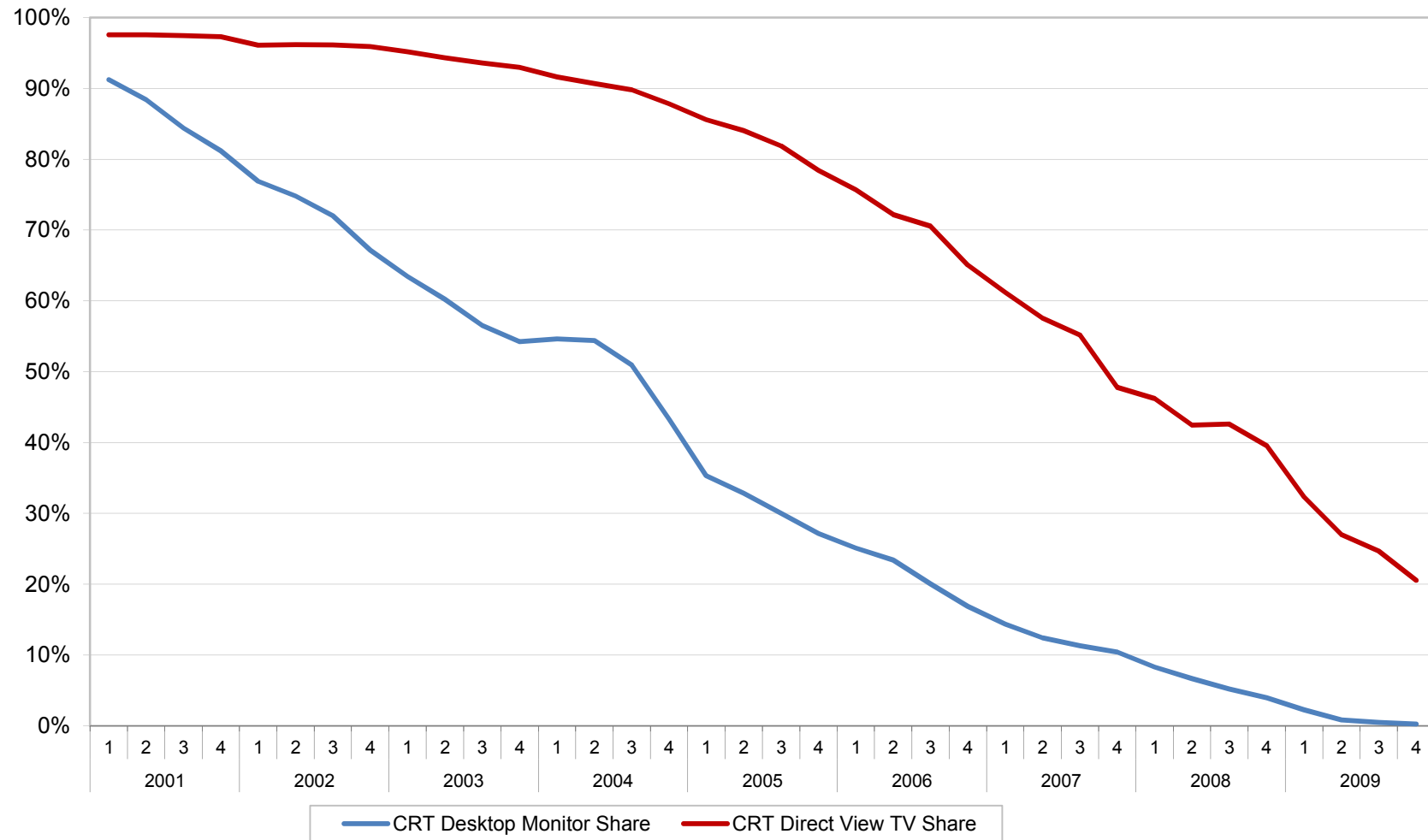
	Category 1	Category 2	Fraction of Prices of CRT Finished Products in Category 2 that Changed in the Opposite Direction to the Change in the Fisher Price Index for Category 1	Fraction of Prices of CRT Finished Products in Category 2 that Did Not Change Despite Change in the Fisher Price Index for Category 1	Sum of the Previous Two Columns
Differences Across Categories	TV	Monitor	35%	2%	37%
	TV	Desktop	28%	4%	32%
	Desktop	Monitor	42%	2%	45%
	Desktop	TV	41%	1%	41%
	Monitor	Desktop	31%	1%	32%
	Monitor	TV	34%	1%	35%
	Small	Large	29%	0%	30%
	Large	Small	36%	2%	37%
Differences Within Categories	Large	Medium	31%	0%	31%
	Medium	Large	24%	0%	25%
	TV	TV	27%	0%	27%
	Monitor	Monitor	28%	4%	32%
	Desktop	Desktop	16%	0%	16%
	Small	Small	29%	1%	30%
	Medium	Medium	27%	0%	27%
	Large	Large	19%	0%	20%

Source: Retailer CRT Finished Product sales data for Amazon, Best Buy, Buy.com, CDW, Circuit City, Costco, Fry's, Office Max, PC Connection, PC Mall, Sam's Club, Walmart, and Zones.

Notes:

- (1) The Retailer CRT Finished Product sales data used in the analysis range from 3/1995-11/2007;
- (2) A price observation in this analysis represents the change in the volume-weighted average price at which a specific CRT finished product model was sold by a specific retailer between two specific months;
- (3) The month-to-month change in the Fisher Price Index for TVs (for example) represents an average across all TV models and retailers of the changes in the prices charged by each retailer for each model; the price changes across months one and two are averaged in two ways - once using the month one sales volumes and once using the month two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes;
- (4) The fractions reported in the table were calculated as follows:
 - Step 1: The 25% of months that saw the largest absolute month-to-month changes in the Fisher Price Index for finished products in Category 1 were identified;
 - Step 2: For each month identified in Step 1, (a) the fraction of finished products in Category 2 (weighted by sales volume) whose sales prices changed in the opposite direction of the Category 1 Fisher Price Index and (b) the fraction whose prices did not change at all during the same time period were identified;
 - Step 3: These fractions were averaged across all months identified in Step 1 using the sales volumes (by model, customer, and month) of finished products in Category 2 as weights;
- (5) A Category 2 CRT finished product price observation was considered not to have changed between two consecutive months if its volume-weighted average price was less than 1 cent;
- (6) Small/Medium/Large categories refer to TVs only. The size categories are defined as follows: Small (0-18"), Medium (19-27"), Large (28+");
- (7) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes for a given retailer minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range.

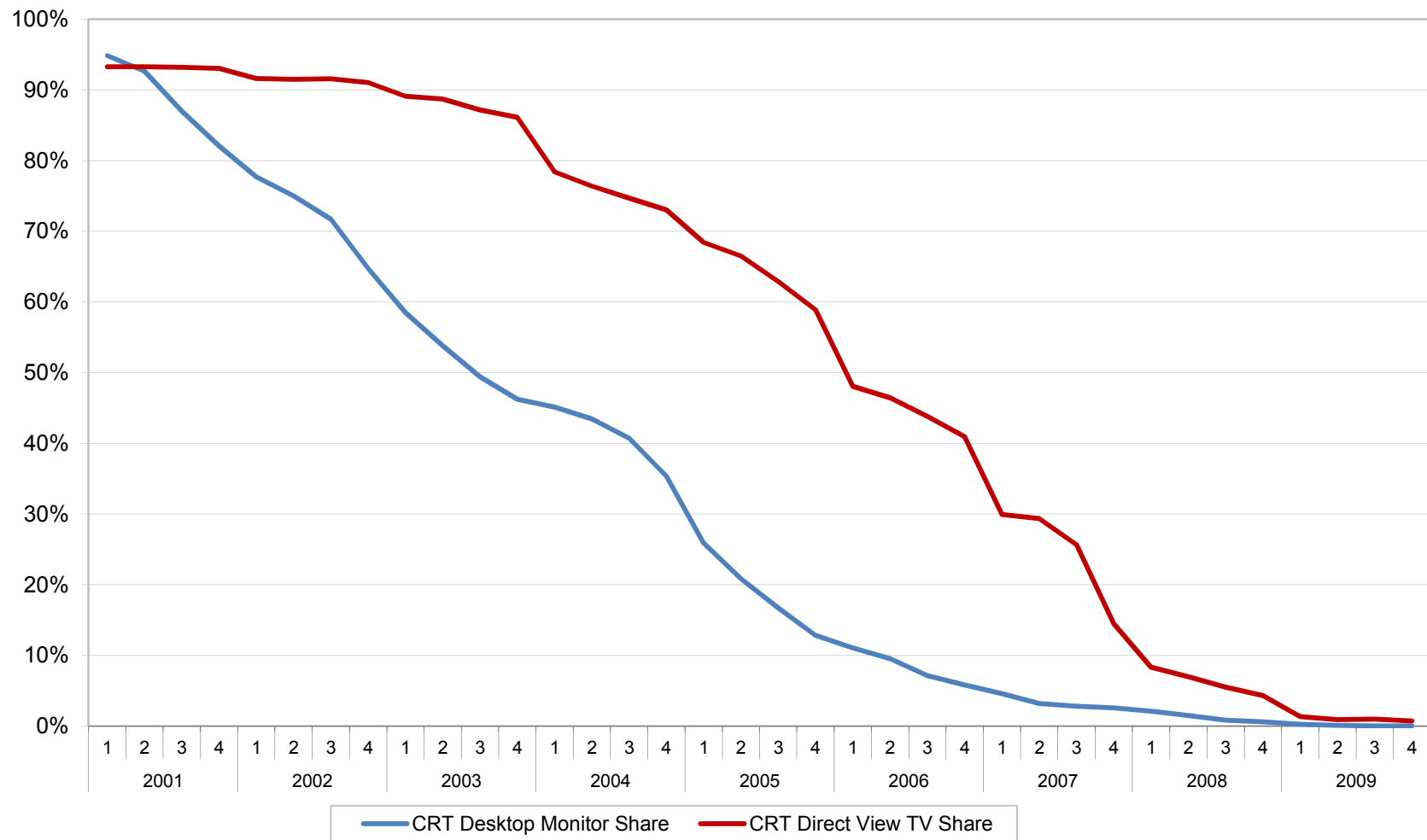
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Exhibit 4A: Worldwide CRT Finished Product Unit Sales Share (2001-2009)

Sources: (1) iSuppli Worldwide Monitor Market Tracker Database; (2) iSuppli Television Systems Market Tracker Database.

Notes: (1) CRT Direct View TV Share represents CRT TV sales as a percentage of CRT, LCD, Plasma, and Projection TV sales; (2) CRT Desktop Monitor Share represents CRT monitor sales as a percentage of CRT and LCD monitor sales.

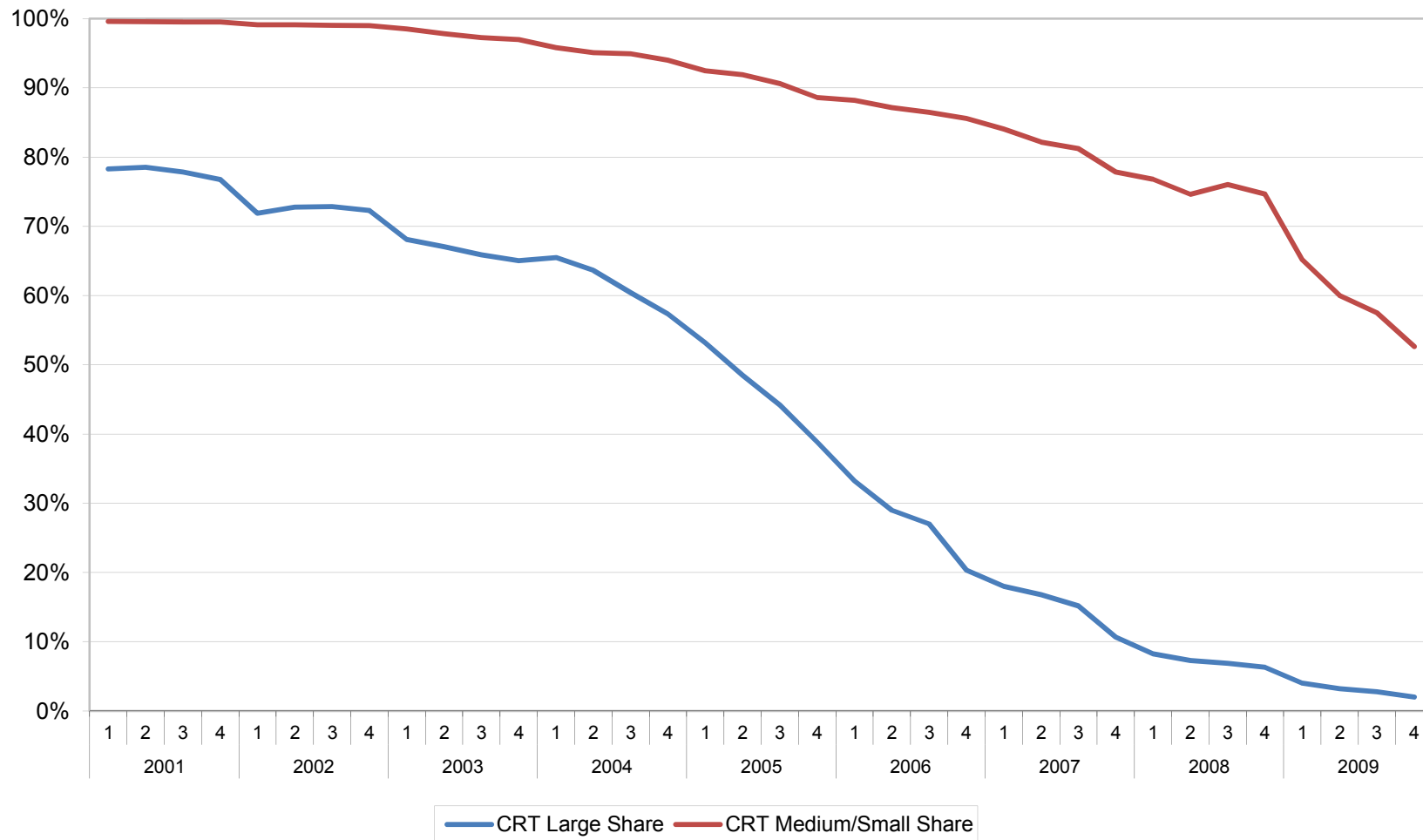
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Exhibit 4B: North American CRT Finished Product Unit Sales Share (2001-2009)

Sources: (1) iSuppli Worldwide Monitor Market Tracker Database; (2) iSuppli Television Systems Market Tracker Database.

Notes: (1) CRT Direct View TV Share represents CRT TV sales as a percentage of CRT, LCD, Plasma, and Projection TV sales; (2) CRT Desktop Monitor Share represents CRT monitor sales as a percentage of CRT and LCD monitor sales.

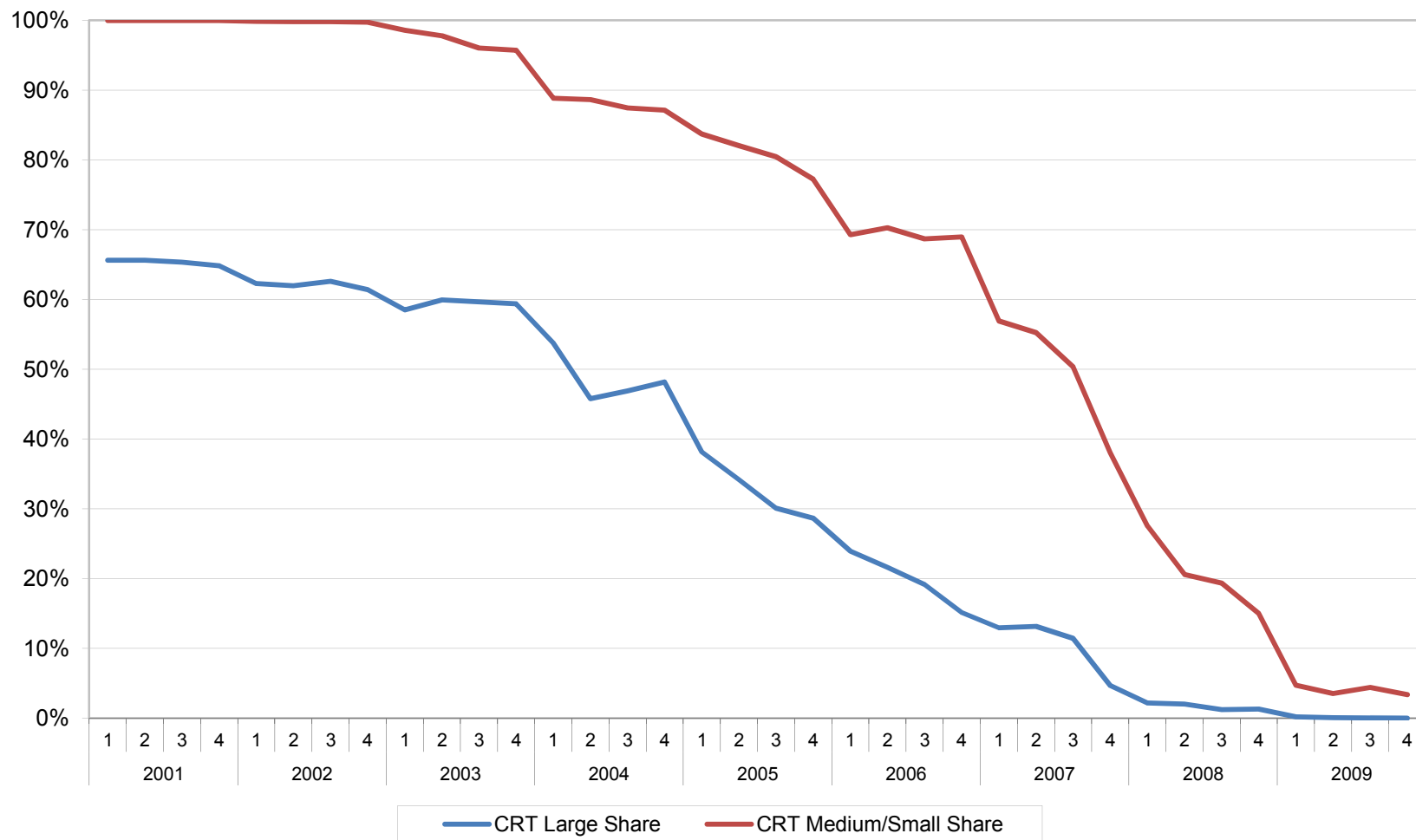
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Exhibit 5A: Worldwide CRT TV Market Share by Size, 2001-2009

Source: iSuppli TV Systems Market Tracker.

Notes: (1) The size categories are defined as follows: Medium/Small (0-29"), Large (30+"); (2) Projection TVs are considered Large; (3) The shares represent Large (or Medium/Small) CRT TV sales as a percentage of Large (or Medium/Small) CRT, LCD, Projection, and Plasma TV sales.

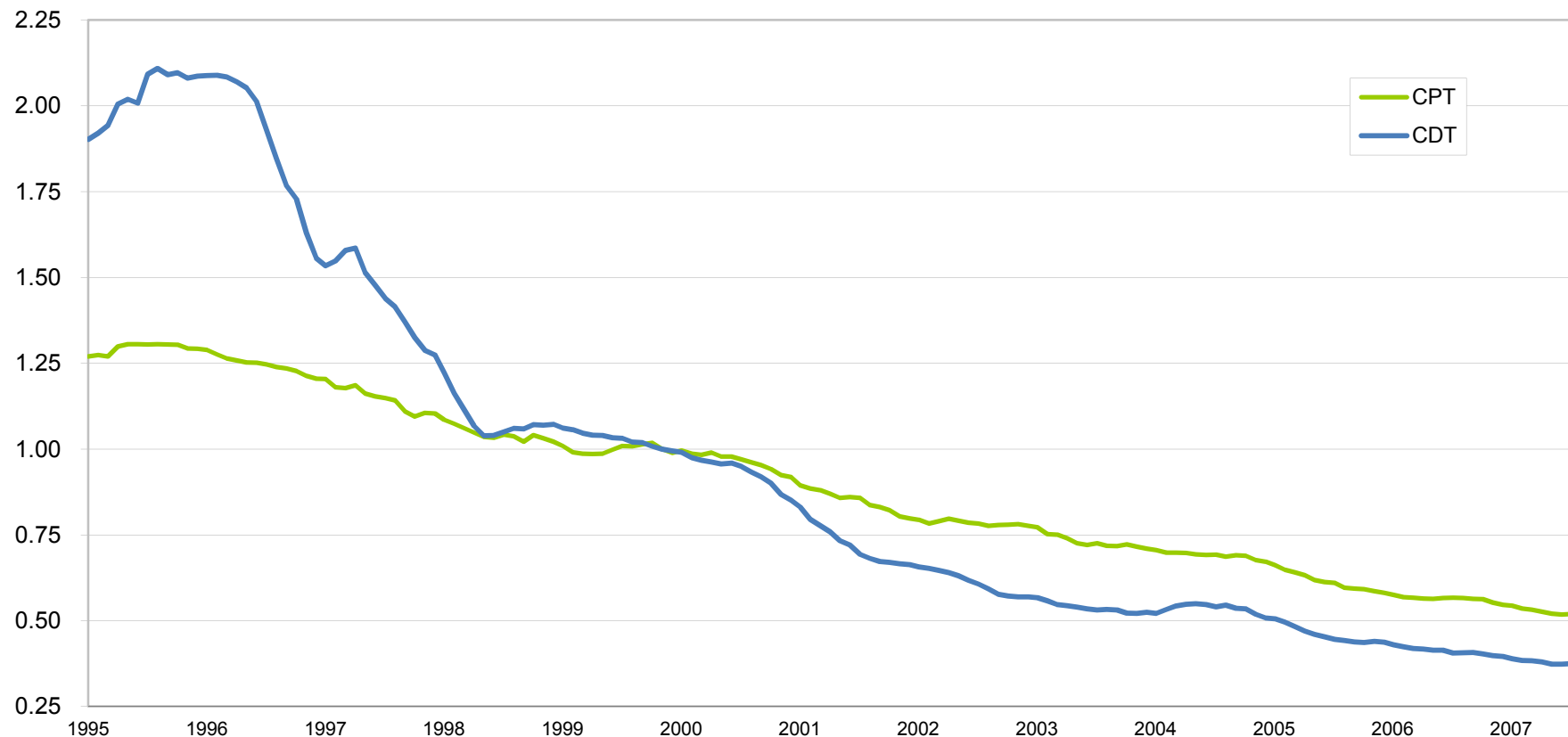
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Exhibit 5B: North American CRT TV Market Share by Size, 2001-2009

Source: iSuppli TV Systems Market Tracker.

Notes: (1) The size categories are defined as follows: Medium/Small (0-29"), Large (30+"); (2) Projection TVs are considered Large; (3) The shares represent Large (or Medium/Small) CRT TV sales as a percentage of Large (or Medium/Small) CRT, LCD, Projection, and Plasma TV sales.

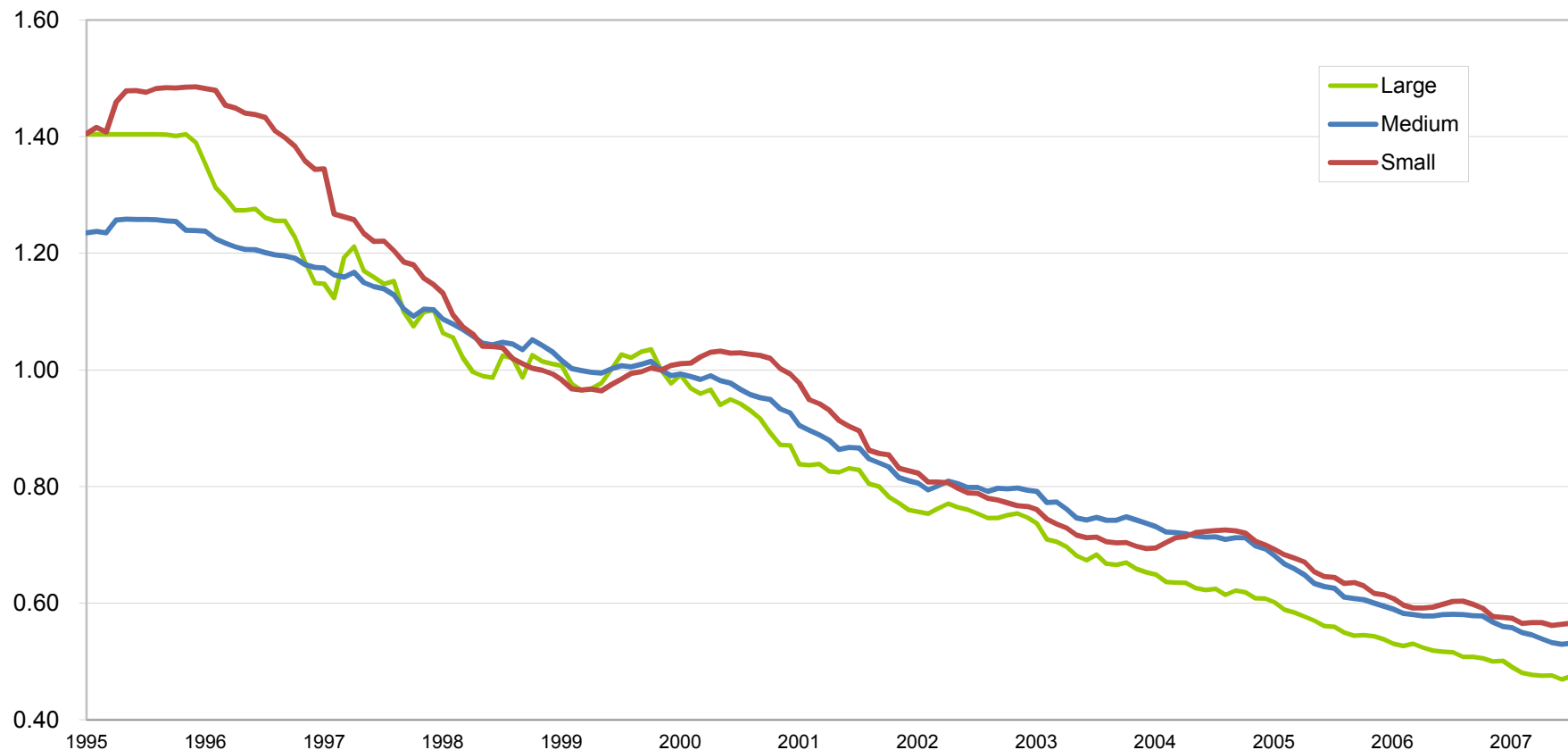
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Exhibit 6: Fisher Indices of Global CPT and CDT Prices

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes: (1) The month-to-month change in the Fisher Price Index for CPTs (for example) represents an average across all CPT models and customers of the changes in the prices paid by each customer for each model; (2) The price changes across months one and two are averaged in two ways - once using the month one sales volumes and once using the month two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes; (3) Each index is set to 1.0 in January 2000; (4) The graph shows the longest uninterrupted period for which data were available beginning in the month preceding the start of the class period; (5) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range; (6) Sales between integrated entities that sold CRTs were excluded.

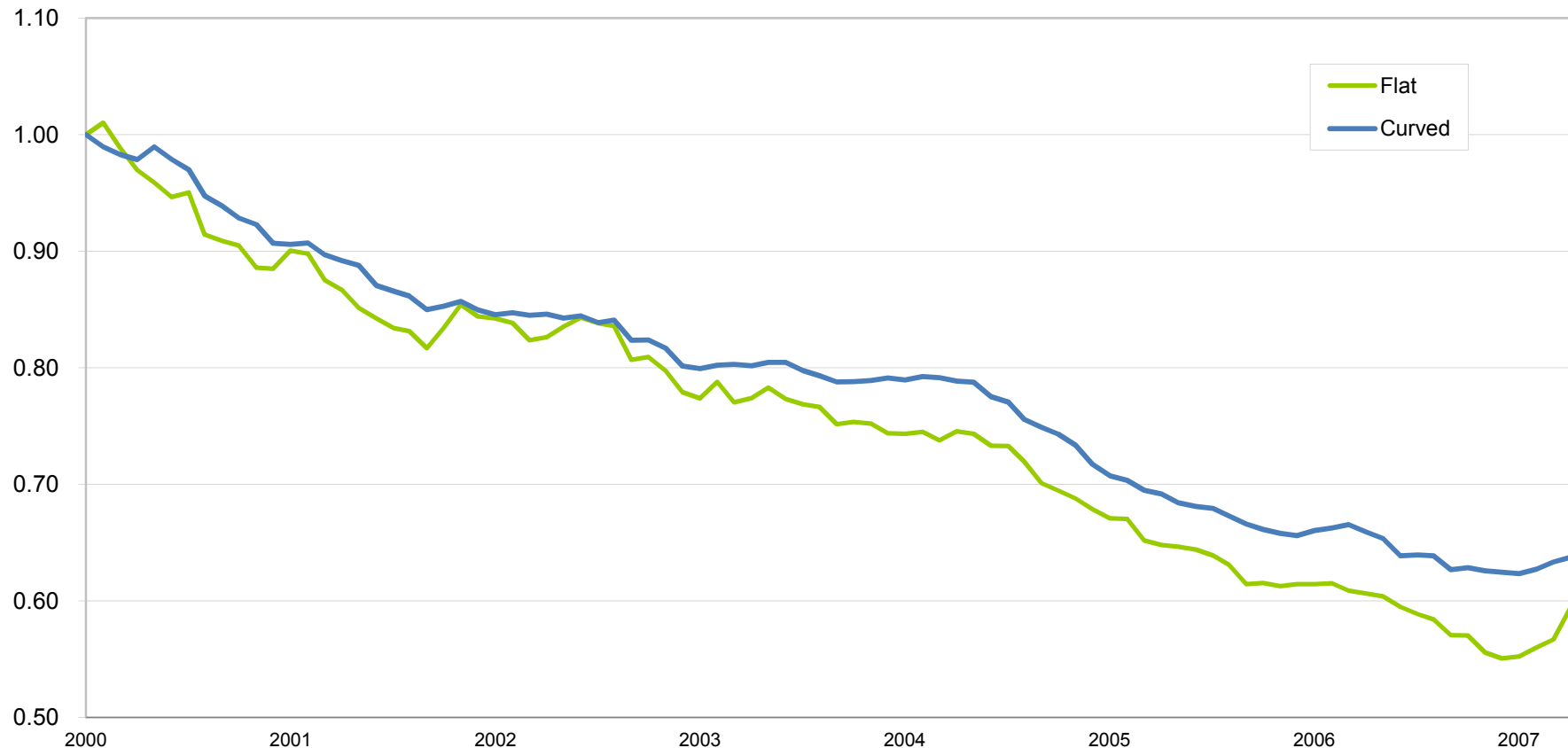
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Exhibit 7: Fisher Indices of CPT Prices by Size

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes: (1) The size categories are defined as follows: Small (0-19"), Medium (20-29"), Large (30+"); (2) The month-to-month change in the Fisher Price Index for large CPTs (for example) represents an average across all large CPT models and customers of the changes in the prices paid by each customer for each model; (3) Price changes across months one and two are averaged in two ways - once using the month one sales volumes and once using the month two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes; (4) Each index is set to 1.0 in January 2000; (5) The graph shows the longest uninterrupted period for which data were available beginning in the month preceding the start of the class period; (6) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range; (7) Sales between integrated entities that sold CRTs were excluded.

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Exhibit 8: Fisher Indices of Flat and Curved CPT Prices

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes: (1) The month-to-month change in the Fisher Price Index for flat CPTs (for example) represents an average across all flat CPT models and customers of the changes in the prices paid by each customer for each model; (2) The price changes across months one and two are averaged in two ways - once using the month one sales volumes and once using the month two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes; (3) Each index is set to 1.0 in January 2000; (4) The graph shows the longest uninterrupted period for which data were available beginning in the month preceding the start of the class period; (5) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range; (6) Sales between integrated entities that sold CRTs were excluded.

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Exhibit 9: Heterogeneity of Price Movements by Region (North America vs. ROW)

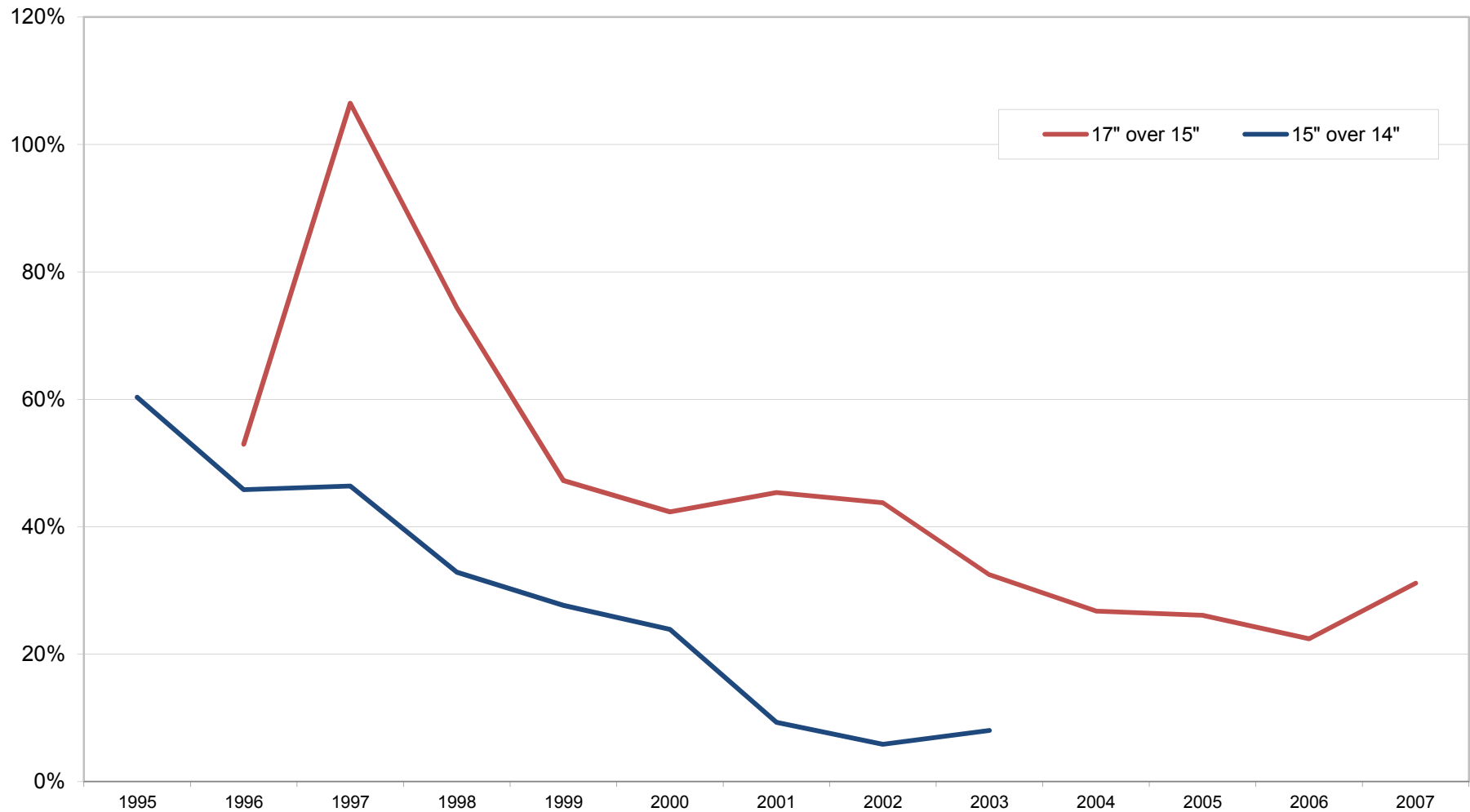
Category 1	Category 2	Fraction of Prices (by Model) of CRTs in Category 2 that Changed in the Opposite Direction to the Change in the Fisher Price Index for Category 1	Fraction of Prices of CRTs in Category 2 that Did Not Change Despite Change in the Fisher Price Index for Category 1	Sum of the Previous Two Columns
NA CPTs	Foreign CPTs	27%	15%	42%
Foreign CPTs	NA CPTs	21%	35%	56%

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, and Panasonic.

Notes:

- (1) The Global CRT sales data range from 3/1995-11/2007;
- (2) Global sales data were used. North American and ROW sales identified using country and/or address fields;
- (3) A price observation in this analysis represents the change in the volume-weighted average price at which a specific CRT model was sold to a specific customer between two specific months;
- (4) The month-to-month change in the Fisher Price Index for TVs (for example) represents an average across all TV models and retailers of the changes in the prices charged by each retailer for each model; the price changes across months one and two are averaged in two ways - once using the month one sales volumes and once using the month two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes;
- (5) The fractions reported in the table were calculated as follows:
 - Step 1: The 25% of months that saw the largest absolute month-to-month changes in the Fisher Price Index of CRTs in Category 1 were identified;
 - Step 2: For each month identified in Step 1, (a) the fraction of prices of CRTs in Category 2 (weighted by sales volume) that changed in the opposite direction of the Category 1 Fisher Price Index and (b) the fraction whose prices did not change at all during the same time period were then estimated;
 - Step 3: These fractions were averaged across all months identified in Step 1 using the sales volumes (by model, customer, and month) of CRTs in Category 2 as weights;
- (6) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range.
- (7) Sales between integrated entities that sold CRTs were excluded.

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**Exhibit 10A: CDT Size Price Premiums Implied by
Dr. Netz's Hedonic Regressions**

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

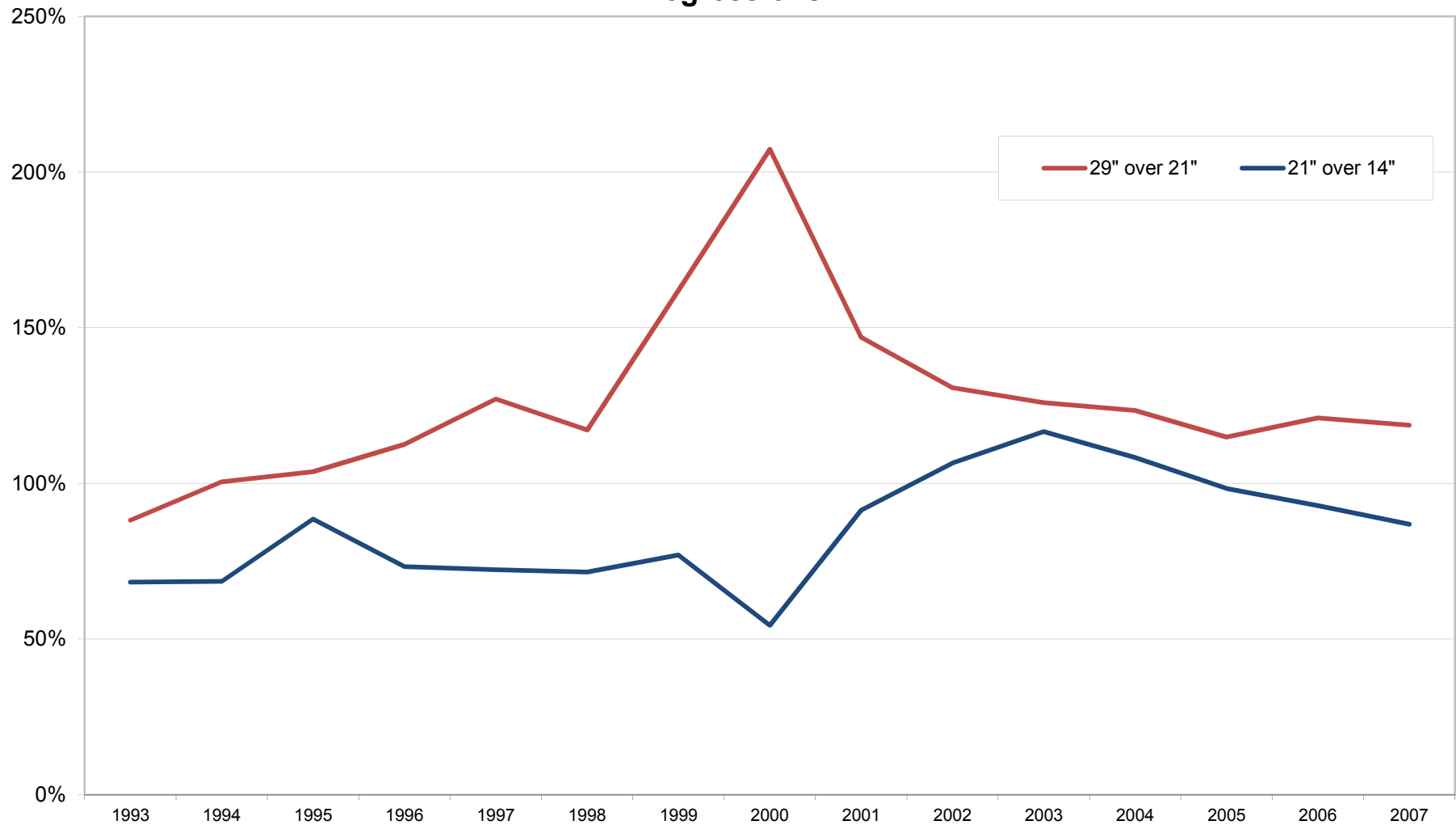
Notes: See Exhibit 10B for notes.

Exhibit 10B: Notes on CDT Size Price Premiums Implied by Dr. Netz's Hedonic Regressions

Notes:

- (1) Size premiums were calculated by running regressions similar to those reported in Exhibit 21 of the Netz Report, but separately for each year and without buyer-seller dummies;
- (2) Data identical to those used by Dr. Netz in Exhibit 21 of the Netz Report were used;
- (3) The data cover the 1993-2007 time period;
- (4) An observation represents sales of a single CDT model to a single buyer in a month;
- (5) The dependent variable in each regression is the natural log price, and the explanatory variables are: monitor size dummies, characteristics dummies (widescreen, ITC, knockdown), a time trend, and a squared time trend;
- (6) The average premiums in each year were calculated by comparing the estimated coefficients on the relevant size dummies in the regression. The formula is: exponential (large size dummy - small size dummy) - 1;
- (5) The CDT sizes analyzed were the only sizes that each accounted for at least 10% of all CDT sales over the analysis period;
- (6) I only report data points that satisfy the following two criteria: (a) They are based on regressions that include at least 100 observations; (b) Each of the sizes being compared in a year has at least ten observations in that year of considerable quantity (i.e., not in the bottom quartile of the quantity distribution in the overall data).

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Exhibit 11A: CPT Size Price Premiums Implied by Dr. Netz's Hedonic Regressions

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes: See Exhibit 11B for notes.

Exhibit 11B: CPT Size Price Premiums Implied by Dr. Netz's Hedonic Regressions

Notes:

- (1) Size premiums were calculated by running regressions similar to those reported in Exhibit 22 of the Netz Report, but separately for each year and without buyer-seller dummies;
- (2) Data identical to those used by Dr. Netz in Exhibit 22 of the Netz Report were used;
- (3) The data cover the 1993-2007 time period;
- (4) An observation represents sales of a single CPT model to a single buyer in a month;
- (5) The dependent variable in each regression is the natural log price, and the explanatory variables are: monitor size dummies, characteristics dummies (widescreen, ITC, knockdown), a time trend, and a squared time trend;
- (6) The average premiums in each year were calculated by comparing the estimated coefficients on the relevant size dummies in the regression. The formula is: exponential (large size dummy - small size dummy) - 1;
- (7) The CDT sizes analyzed were the only sizes that accounted for at least 10% of all CPT sales over the analysis period;
- (8) All the data points in the Exhibit satisfy the following two criteria: (a) They are based on regressions that include at least 100 observations; (b) Each of the sizes being compared in a year has at least ten observations in that year of considerable quantity (i.e., not in the bottom quartile of the quantity distribution in the overall data).

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Exhibit 12: Size Premiums Over Time by Manufacturer CDT**Price Premium: 15" vs. 14"**

Manufacturer	1996	1997	1998	1999	2000	2001
Chunghwa	39%	45%	35%	27%	24%	8%
Philips	-	5%	-	-	-	-
SDI	-	-	31%	32%	25%	9%
Toshiba	18%	-	-	-	-	-

Price Premium: 17" vs. 15"

Manufacturer	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Chunghwa	84%	66%	49%	41%	44%	47%	21%	18%	20%	14%
Panasonic	78%	-	-	-	-	-	-	-	-	-
Philips	187%	-	-	-	-	-	-	-	-	-
SDI	-	72%	49%	43%	45%	43%	35%	29%	28%	27%
Toshiba	53%	64%	24%	-	-	-	-	-	-	-

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes:

- (1) Size premiums were calculated by running regressions similar to those presented in Exhibit 21 of the Netz Report, but separately for each year and manufacturer and without buyer-seller dummies;
- (2) Data identical to those used by Dr. Netz in Exhibit 21 of the Netz Report;
- (3) The data cover the 1993-2007 time period;
- (4) An observation represents sales of a single CDT model to a single buyer in a month;
- (5) The dependent variable in each regression is the natural log price, and the explanatory variables are: monitor size dummies, characteristics dummies (widescreen, ITC, knockdown), a time trend, and a squared time trend;
- (6) The average premiums in each year were calculated by comparing the estimated coefficients on the relevant size dummies in the regression. The formula is: exponential (large size dummy - small size dummy) - 1;
- (7) The CDT sizes analyzed were the only sizes that accounted for at least 10% of all CDT sales over the analysis period;
- (8) I only report data points that satisfy the following two criteria: (a) They are based on regressions that include at least 100 observations; (b) Each of the sizes being compared for a manufacturer in a year has at least ten observations for that manufacturer in that year of considerable quantity (i.e., not in the bottom quartile of the quantity distribution in the overall data). I do not report years for which fewer than two manufacturers satisfy the above criteria for the sizes being compared.

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Exhibit 13: Size Premiums Over Time by Manufacturer CPT**Price Premium: 21" over 14"**

Manufacturer	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Chunghwa	83%	88%	76%	82%	88%	93%	88%	78%	75%	-
Panasonic	-	-	-	-	-	139%	127%	110%	101%	89%
SDI	68%	72%	47%	71%	92%	113%	110%	100%	94%	87%

Price Premium: 29" over 21"

Manufacturer	2001	2002	2003	2004	2005	2006	2007
Chunghwa	-	-	-	123%	121%	123%	-
Panasonic	121%	122%	121%	129%	121%	123%	119%
SDI	161%	137%	121%	110%	104%	113%	117%

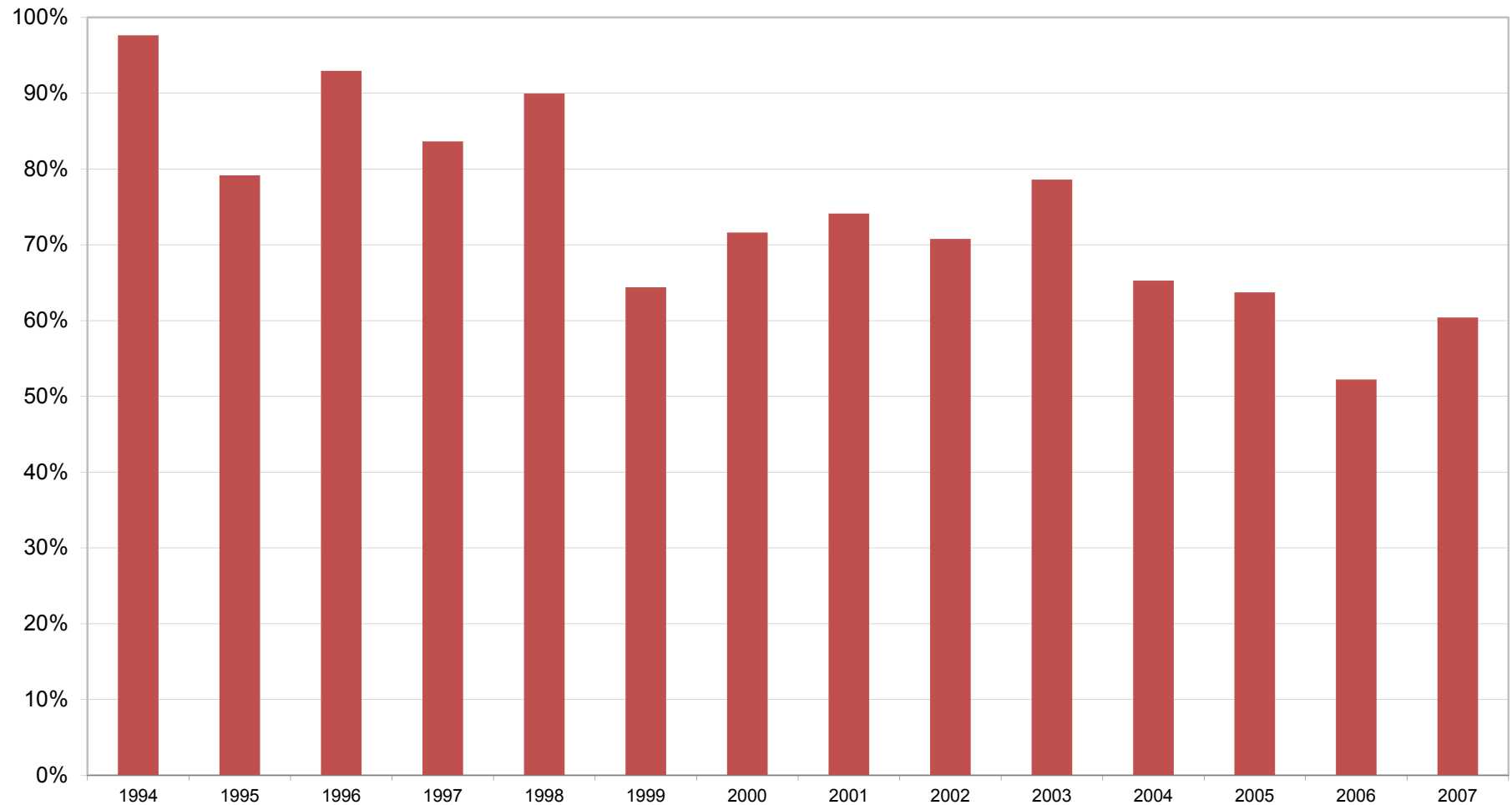
Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes:

- (1) Size premiums were calculated by running regressions similar to those presented in Exhibit 22 of the Netz Report, but separately for each year and manufacturer and without buyer-seller dummies;
- (2) Data identical to those data used by Dr. Netz in Exhibit 22 of the Netz Report;
- (3) The data cover the 1993-2007 time period;
- (4) An observation represents sales of a single CPT model to a single buyer in a month;
- (5) The dependent variable in each regression is the natural log price and the explanatory variables are: monitor size dummies, characteristics dummies (widescreen, ITC, knockdown), a time trend, and a squared time trend;
- (6) The average premiums in each year were calculated by comparing the estimated coefficients on the relevant size dummies in the regression. The formula is: exponential (large size dummy - small size dummy) - 1;
- (7) The CPT sizes analyzed were the only ones that accounted for at least 10% of all CPT sales over the analysis period;
- (8) I only report data points that satisfy the following two criteria: (a) They are based on regressions that include at least 100 observations; (b) Each of the sizes being compared for a manufacturer in a year has at least ten observations for that manufacturer in that year of considerable quantity (i.e., not in the bottom quartile of the quantity distribution in the overall data). I do not report years for which fewer than two manufacturers satisfy the above criteria for the sizes being compared.

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**Exhibit 14A: Share of Observations with Gap Between Actual and Predicted
Prices Above 5% (CDTs)**



Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes: See Exhibit 14B for notes.

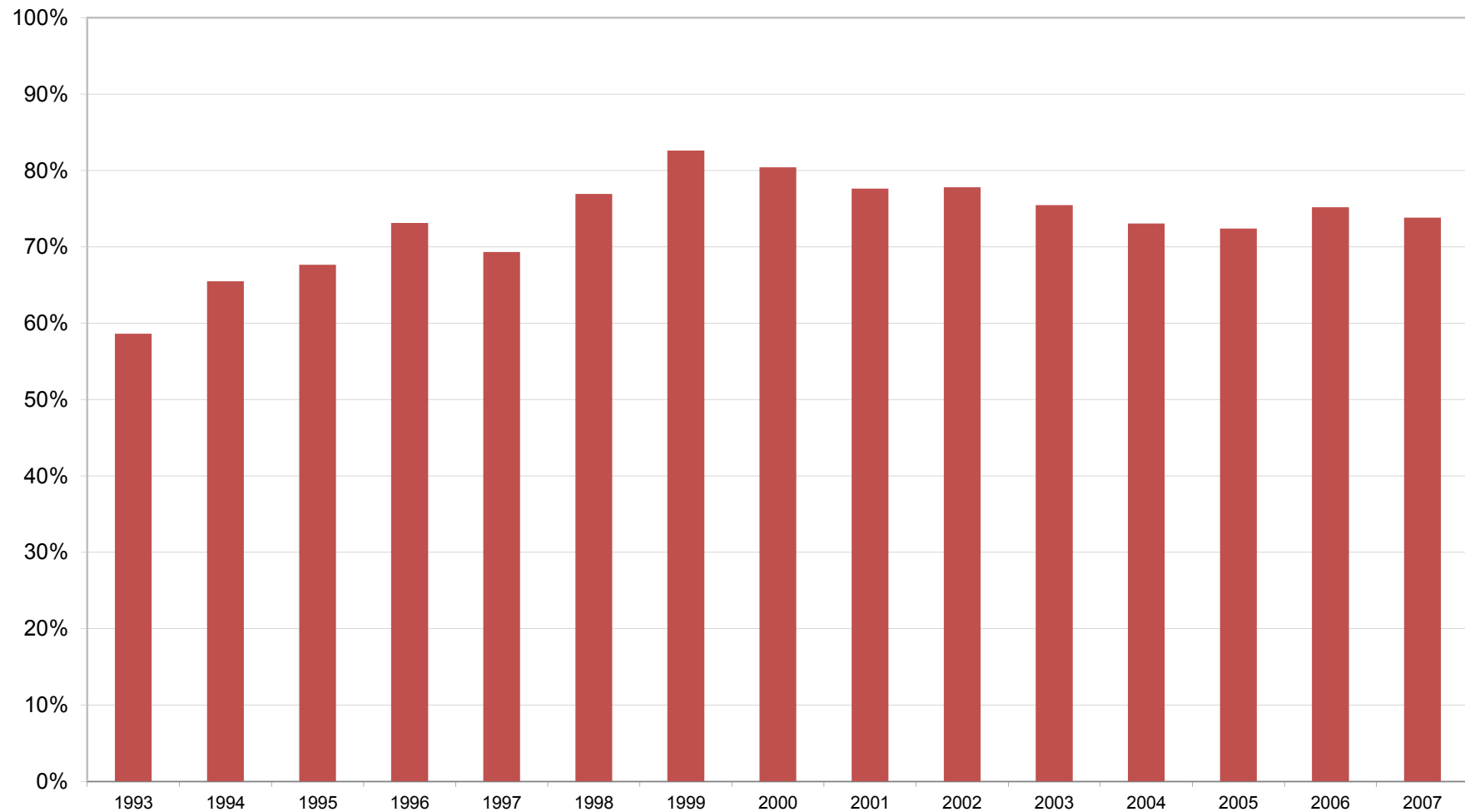
Exhibit 14B: Notes for Percent of Observations with Gap Between Actual and Predicted Prices Above 5% (CDTs)

Notes:

- (1) Gaps were calculated by running regressions similar to those presented in Exhibit 21 of the Netz Report, but without buyer-seller dummies;
- (2) Data identical to those used by Dr. Netz in Exhibit 21 of the Netz Report were used;
- (3) The data cover the 1993-2007 time period;
- (4) An observation represents sales of a single CDT model to a single buyer in a month;
- (5) The dependent variable in each regression is the natural log price, and the explanatory variables are: monitor size dummies, characteristics dummies (widescreen, ITC, knockdown), a time trend, and a squared time trend;
- (6) Gaps were calculated using the following steps: (a) The predicted price was calculated for each observation based on the estimated regression equation; (b) The gap for each observation represents the absolute value of the percentage difference between the predicted price and the actual price; (c) For each year, the fraction of observations for which the gap was greater than 5% was calculated and plotted.

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**Exhibit 15A: Share of Observations with Gap Between Actual and Predicted
Prices Above 5% (CPTs)**



Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Note: See Exhibit 15B for notes.

Exhibit 15B: Notes for Percent of Observations with Gap Between Actual and Predicted Prices Above 5% (CPTs)

Notes:

- (1) Gaps were calculated by running regressions similar to those presented in Exhibit 22 of the Netz Report, but without buyer-seller dummies;
- (2) Data identical to those used by Dr. Netz in Exhibit 22 of the Netz Report were used;
- (3) The data cover the 1993-2007 time period;
- (4) An observation represents sales of a single CPT model to a single buyer in a month;
- (3) The dependent variable in each regression is the natural log price, and the explanatory variables are: monitor size dummies, characteristics dummies (widescreen, ITC, knockdown), a time trend, and a squared time trend;
- (4) Gaps were calculated using the following steps: (a) The predicted price was calculated for each observation based on the estimated regression equation;
- (b) The gap for each observation represents the absolute value of the percentage difference between the predicted price and the actual price; (c) For each year, the fraction of observations for which the gap was above 5% was calculated and plotted.

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Exhibit 16: Regressions of Changes in Actual Price on Changes in Target Price

Dependent Variable Change in Actual Price (Level of Aggregation)	Independent Variable Change in Target Price (Level of Aggregation)	Merchant Sales Only?	Transfer Sales Only?	Results		
				Number of Observations	Coefficient on Change in Target Price	R-Squared
Model, Customer, Month	Group, Month			7,231	0.084***	0.020
Model, Customer, Month	Group, Month	X		6,735	0.092***	0.024
Model, Customer, Month	Group, Month		X	496	-0.005	0.000
Group, Month	Group, Month			483	0.145***	0.034

Sources:

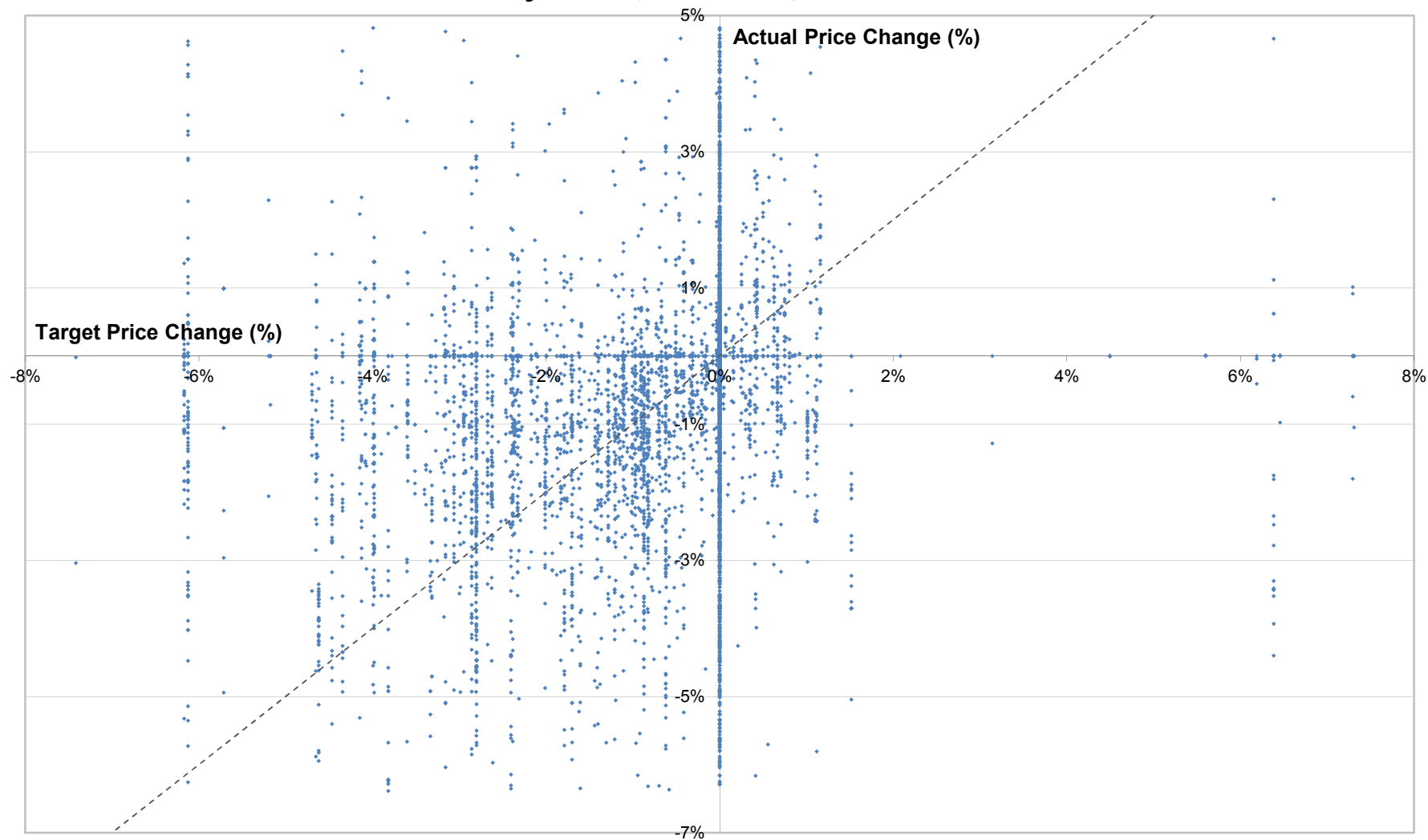
- (1) Global CRT sales data for Chunghwa, MTPD, Panasonic, LPD, SDI, and Toshiba;
- (2) Netz Target Price data.

Notes:

- (1) Actual prices were calculated for month t by manufacturer, model, and customer ("model-customer") using global CRT sales data for November 1996 to May 2006;
 - (2) Target prices were calculated for month t by manufacturer, CRT type (CDT/CPT), size, and bare/ITC status ("group") (there were usually many model-customer combinations for a given group);
 - (3) Actual and target price changes represent the average monthly actual price change for a given model-customer (or group) and the average monthly target price change for the corresponding group between months t and $t-x$, where x is defined as the smallest positive integer (possibly equal to 1) for which there were actual prices for the model and customer (or group) and target prices for the group in months t and $t-x$. That is, the actual and target prices changes were calculated over the same period of time, and x represents the shortest period over which this was possible;
 - (4) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range;
 - (5) Sales between integrated entities that sold CRTs were excluded.
 - (6) Observations with more than one year between the observed pairs of actual price changes and target price changes were excluded;
 - (7) I performed the following robustness checks:
 - weighting observations by sales volume;
 - varying the maximum period between pairs of actual and target price changes;
 - aggregating prices by target price document rather than by month;
 - using robust standard errors;
- None of these robustness checks affected the reported results in a material fashion;
- (8) (***) indicates that the estimated coefficient is different from zero at the 0.1% significance level.

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**Exhibit 17A: Actual Price Change vs. "Target Price" Change
by Model, Customer, and Month**



Sources: (1) Global CRT Sales data for Chunghwa, MTPD, Panasonic, LPD, SDI, and Toshiba; (2) Netz Target Price data.

Notes: See Exhibit 17B for notes.

Exhibit 17B: Actual Price Change vs. Target Price Change by Model, Customer, and Month

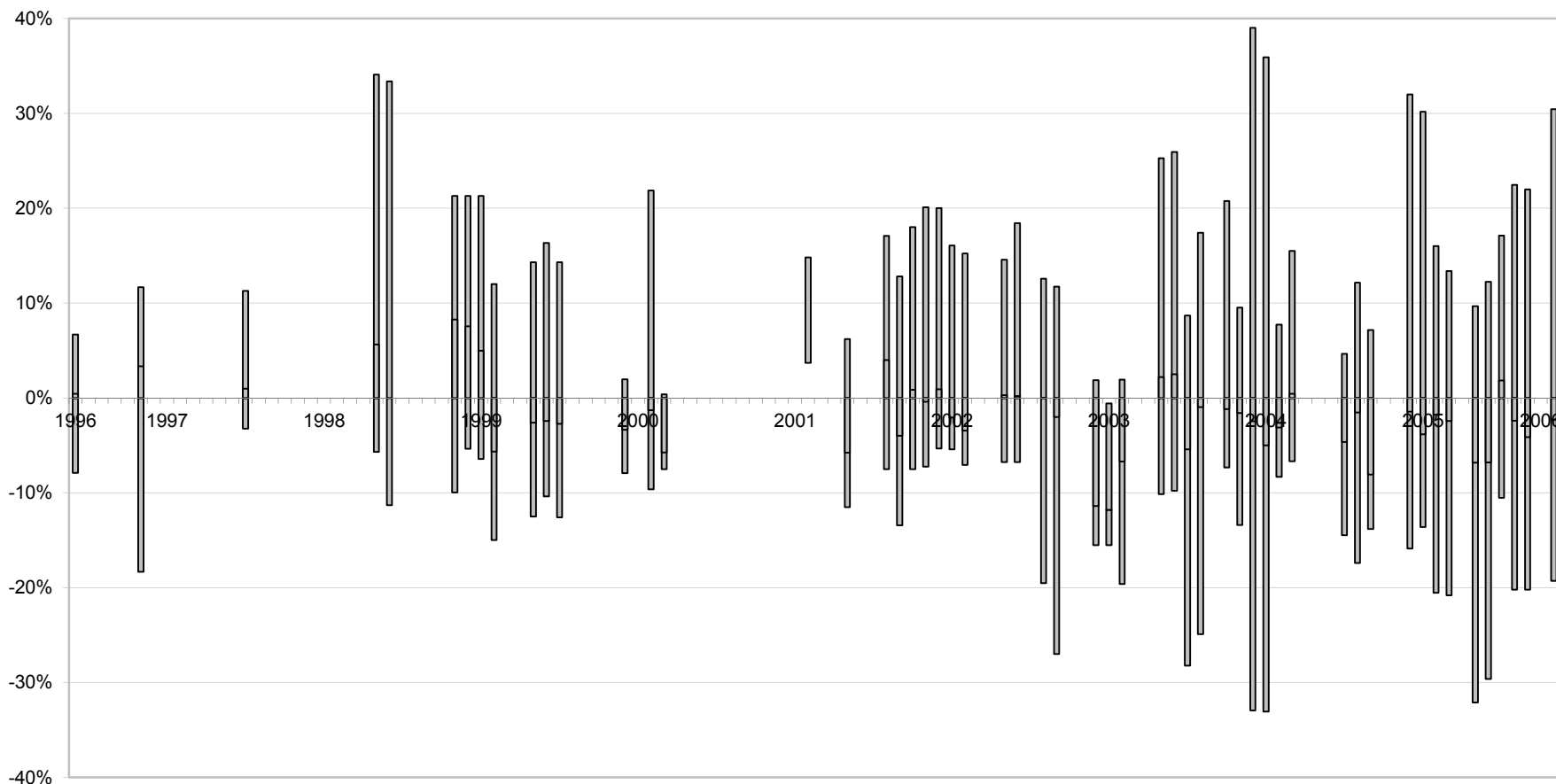
Notes:

- (1) Actual prices were calculated for month t by manufacturer, model, and customer ("model-customer") using global CRT sales data for November 1996 to May 2006;
- (2) Target prices were calculated for month t by manufacturer, CRT type (CDT/CPT), size, and bare/IC status, i.e. "group" (there were usually many model-customer combinations for a given group);
- (3) An observation represents the average monthly actual price change for a given model-customer and the average monthly target price change for the corresponding group between months t and $t-x$, where x is defined as the smallest positive integer (possibly equal to 1) for which there were actual and target prices, respectively, for the model-customer and group in months t and $t-x$. That is, the actual and target prices changes were calculated over the same period of time, and x represents the shortest period over which this was possible;
- (4) Sales between integrated entities that sold CRTs were excluded.
- (5) Observations with more than one year between the observed pairs of actual price changes and target price changes were excluded;
- (6) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range.

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Exhibit 18: Quantity-Weighted Distribution of Difference Between Actual Price of CRT Models and Alleged Applicable Target Price

Price Difference



Sources: (1) Global CRT sales data for Chunghwa, MTPD, Panasonic, LPD, SDI, and Toshiba; (2) Netz Target Price data.

Notes: (1) The shaded boxes represent the volume weighted range of percentage differences included between the 10th and 90th percentile of the distribution of the percentage differences between the actual price and the corresponding alleged target price in a given month; (2) The horizontal line within each box represents the volume weighted median of the percentage differences in that month; (3) The actual prices represent the volume weighted price for a given manufacturer, model, customer, and month; (4) The target prices represent the average target price for a given manufacturer, CRT type, size, and bare/ITC status and month; (5) Sales between integrated entities that sold CRTs were excluded.

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Exhibit 19: Share of Actual Prices More than 5% Below the Minimum Potentially Applicable Target Price and Share of Actual Prices More than 5% Above the Maximum Potentially Applicable Target Price

Share of Actual Prices More than 5% Below the Minimum Potentially Applicable Target Price	Share of Actual Prices Within 5% of the Range of Potentially Applicable Target Prices	Share of Actual Prices More than 5% Above the Maximum Potentially Applicable Target Price
30%	48%	23%

Sources:

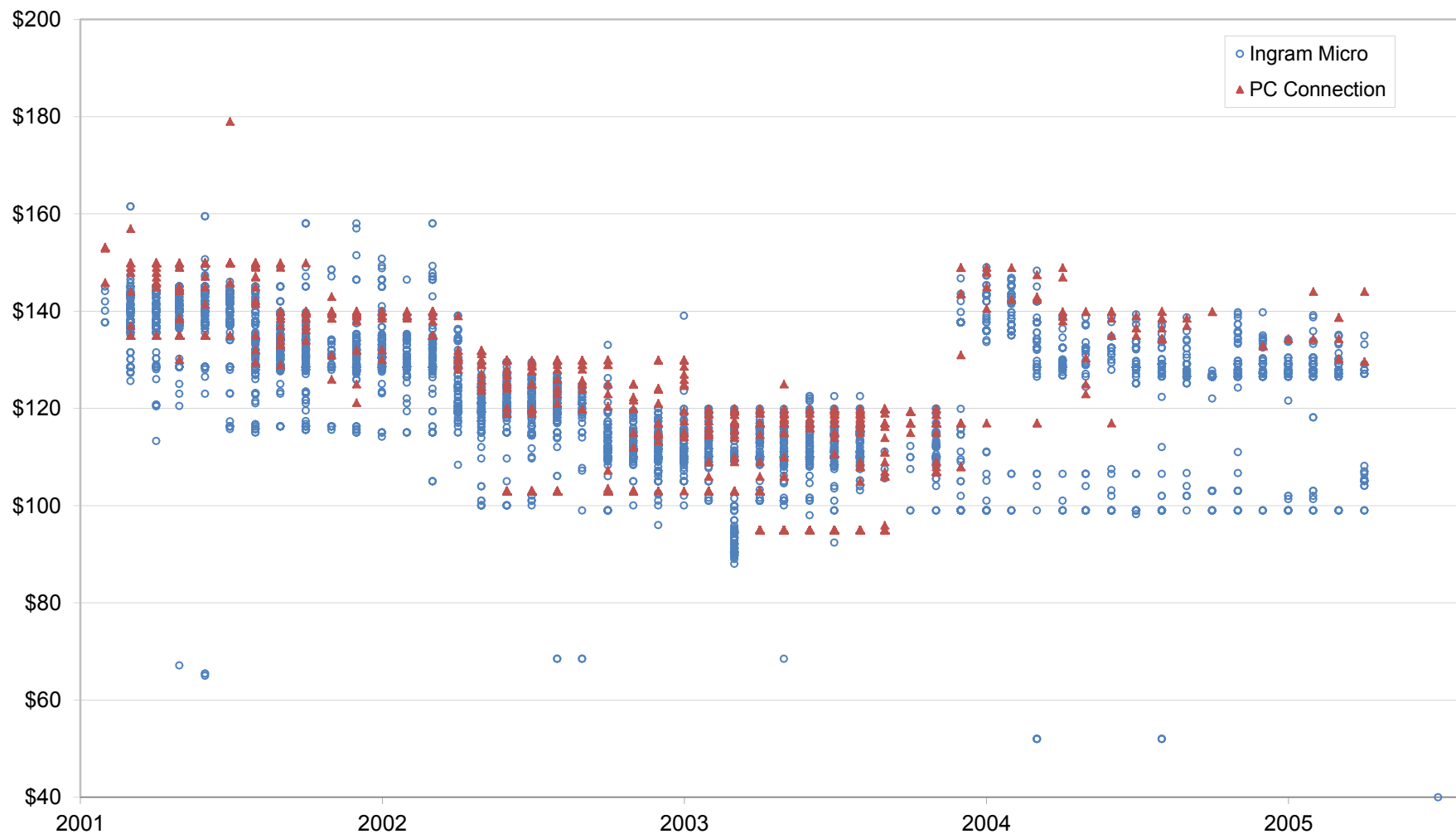
- (1) Global CRT sales data for Chunghwa, MTPD, Panasonic, LPD, SDI, and Toshiba;
- (2) Netz Target Price data.

Notes:

- (1) Actual prices represent the average price for a given model and customer (“model-customer”) and month;
- (2) Dr. Netz identifies a number of alleged target prices for a given manufacturer, CRT type (CDT/CPT), size, and bare/ITC status (“group”), and month;
- (3) For a given group, these target prices may vary by MPRII/TCO, shipment method, dot pitch, mask, frequency, and flat/curved (“non-group characteristics”);
- (4) The minimum (maximum) potentially applicable target price for a given model-customer refers to the lowest (highest) target price for the corresponding group;
- (5) Because target prices for a group are often associated with a specific set of non-group characteristics, and the non-group characteristics for a particular CRT model generally cannot be identified in the CRT sales data, a target price associated with a given group may or may not be applicable to a particular CRT model that is also associated with that group;
- (6) Shares are weighted by sales volume;
- (7) Sales between integrated entities that sold CRTs were excluded.

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**Exhibit 20: Distribution of PC Connection and Ingram Micro Prices by Month for
15-inch Lenovo CRT Monitor, Product #633147N**

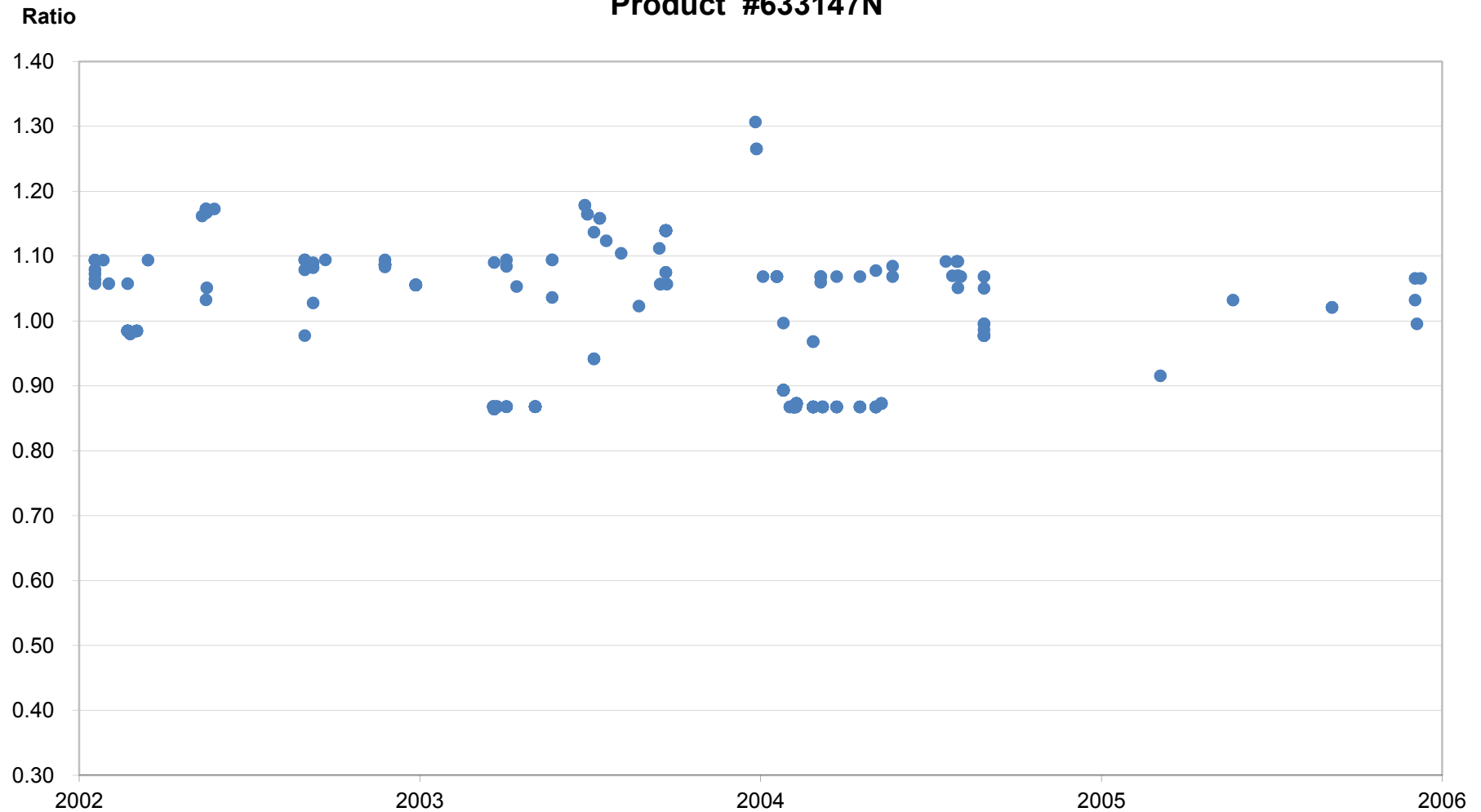


Sources: (1) Ingram Micro sales and procurement data; (2) PC Connection sales and procurement data.

Note: Each point represents a transaction price for product #633147N.

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**Exhibit 21: PC Connection Price-to-Cost Ratio for 15-inch Lenovo CRT Monitor,
Product #633147N**



Source: PC Connection sales and procurement data.

Notes: (1) Each point represents a transaction price/transaction cost ratio; (2) Days when both sales and purchases were made were included; (3) Transactions on January 22, 2003, April 23, 2003, August 11, 2003, October 28, 2003, January 29, 2004, and September 30, 2004 were excluded because there were multiple costs associated with the transactions that occurred during these days.

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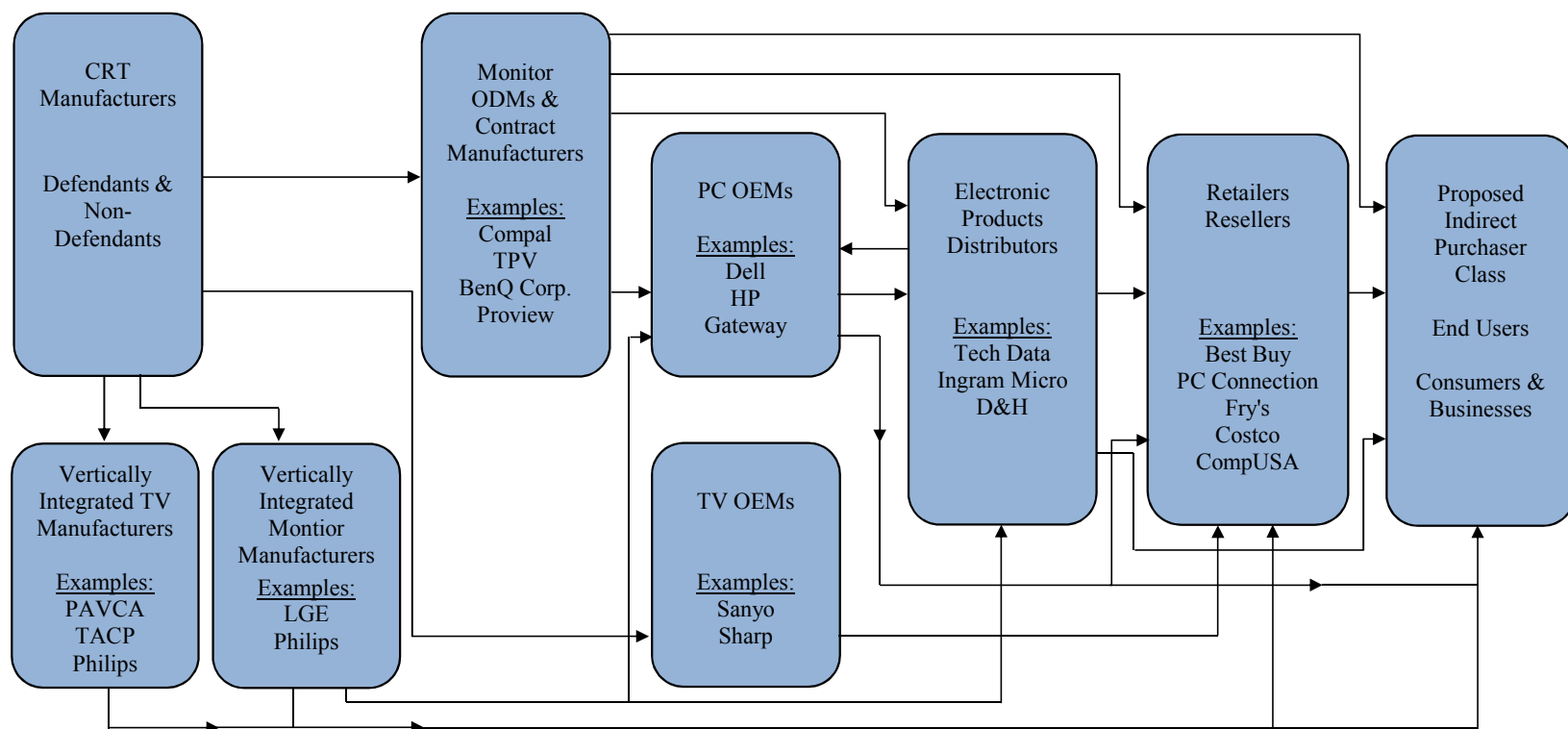
**Exhibit 22: Ingram Price-to-Cost Ratio for 15-inch Lenovo CRT Monitor,
Product #633147N**



Source: Ingram Micro sales and procurement data.

Notes: (1) Each point represents a transaction price/transaction cost ratio; (2) Days when both sales and purchases were made were included.

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Exhibit 23: Distribution Channels for CRTs

Sources: (1) Global CRT sales data for Chunghwa, MTPD, Panasonic, LPD, SDI, and Toshiba; (2) CRT finished product sales data for TACP, LGE, BenQ America, Sanyo, Ingram Micro, Tech Data, and PC Connection; (3) CRT and CRT finished product procurement data for Tech Data, LGE, Dell, Sanyo, and PC Connection.

Notes: (1) Product flows between the various elements in this chart are consistent with produced sales and procurement data sets listed above; (2) OEMs typically employ contract manufacturers and ODMs to manufacture CRT finished products; (3) In addition to manufacturing finished products for OEMs to be sold under the OEMs' brand names, ODMs can manufacture and sell finished products under their own brand names (IHS iSuppli, March 23, 2009, "Original Design Manufacturer (ODM) Definition, Analysis, Competitors, Research", <http://www.isuppli.com/Manufacturing-and-Pricing/News/Pages/Adam-Pick-Principal-Analyst-EMS-ODM.aspx>, accessed December 14, 2012; (4) Typically, ODMs own or license the IP for their product and their design. (Weber, Austin, February 1, 2003, "Outsourcing's Alphabet Soup," Assembly Magazine, <http://www.assemblymag.com/articles/82852-outsourcing-s-alphabet-soup>, accessed December 14, 2012.)

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Exhibit 24A: Observed Actual Pass-Through Rates vs. Dr. Netz's Estimated Average Pass-Through Rates

Name	Type	Channel	Netz Estimated Average Pass-Through Rate	Total Number of Cost Change Events	Share of Cost Change Events with:		
					Actual Pass-Through ≤ 0	Actual Pass-Through ≤ 0.5	Actual Pass-Through ≥ 1.0
Amazon	Monitors	Internet Retailer	1.04	88	42%	57%	24%
Amazon	Televisions	Internet Retailer	1.17***	30	--	--	--
Arrow	Monitors	Product Distributor	1.09***	69	5%	19%	40%
BenQ America	Monitors	Product Distributor	1.12***	27	--	--	--
Buy.com	Monitors	Internet Retailer	1.16***	2	--	--	--
Buy.com	Televisions	Internet Retailer	1.05***	2	--	--	--
CDW	Monitors	Internet Retailer	1.00	28	--	--	--
CDW	Televisions	Internet Retailer	1.02	8	--	--	--
Costco	Monitors	Brick & Mortar Retailer	1.07***	11	--	--	--
Costco	Televisions	Brick & Mortar Retailer	1.07***	104	4%	10%	73%
Fry's	Monitors	Brick & Mortar Retailer	1.13***	143	15%	31%	53%
Funai	Televisions	Product Manufacturer	1.13***	13	--	--	--
Gateway	Monitors	Product Manufacturer	1.12***	3	--	--	--
Ingram Micro	Monitors	Product Distributor	1.02***	360	7%	34%	30%
Ingram Micro	Televisions	Product Distributor	1.03***	7	--	--	--
OfficeMax	Desktops	Brick & Mortar Retailer	1.09***	11	--	--	--
OfficeMax	Monitors	Brick & Mortar Retailer	1.01**	69	15%	28%	20%
PC Connection	Monitors	Internet Retailer	1.09***	757	20%	52%	17%
PC Connection	Televisions	Internet Retailer	1.06***	3	--	--	--
PC Mall	Desktops	Internet Retailer	1.01	2	--	--	--
PC Mall	Monitors	Internet Retailer	1.10***	1,254	18%	50%	23%
PC Mall	Televisions	Internet Retailer	1.12***	3	--	--	--
Sam's Club (Retail)	Televisions	Brick & Mortar Retailer	0.98	1	--	--	--
Sam's Club (Transaction)	Televisions	Brick & Mortar Retailer	1.13***	1	--	--	--
Tatung	Monitors	Product Manufacturer	1.00	51	53%	81%	10%
Tech Data	Monitors	Product Distributor	1.00***	200	12%	53%	19%
Toshiba America Consumer Products (TACP)	Televisions	Product Manufacturer	1.12***	202	26%	85%	8%
Toshiba America Information Systems (TAIS)	Monitors	Product Distributor	1.12	15	--	--	--
Walmart (Retail)	Televisions	Brick & Mortar Retailer	1.10*	4	--	--	--
Walmart (Transaction)	Televisions	Brick & Mortar Retailer	1.06***	4	--	--	--
Walmart/Sanyo	Televisions	Brick & Mortar Retailer	1.16***	5	--	--	--
Zones	Desktops	Internet Retailer	1.13***	2	--	--	--
Zones	Monitors	Internet Retailer	1.04***	85	30%	43%	24%

Source: All relevant sales and procurement data for retailers listed.

Notes: See Exhibit 24B for notes.

Exhibit 24B: Observed Actual Pass-Through Rates vs. Dr. Netz's Estimated Average Pass-Through Rates

Notes:

- (1) A "cost-change event" is defined as a change in the cost of a CRT finished product from one month to the next. Only cost changes of at least 5% of the weighted mean cost with no similar magnitude cost change in the following or preceding month were included;
- (2) "The actual pass-through rate" was calculated by dividing the difference between the actual price change from one month to the next by the actual cost change for the same period;
- (3) The distribution of actual pass-through rates was only calculated for datasets with 50 or more "cost-change events";
- (4) The datasets used in the exhibit were compiled in the same manner as the datasets used in Exhibit 34 of the Netz Report (aggregated to the monthly level), with two exceptions: Ingram Micro and TACP. For details, see Section C of the Appendix;
- (5) The following datasets (included in Exhibit 34 of the Netz Report) were excluded from the analysis for reasons explained in Section G of the Appendix: Dell Monitors, DisplaySearch top-and-bottom dataset, Best Buy and Toshiba America Electronics Corporation;
- (6)(***) indicates that the estimated coefficient is different from zero at the 0.1% significance level. (**) indicates that the estimated coefficient is different from zero at the 1% significance level. (*) indicates that the estimated coefficient is different from zero at the 5% significance level.

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Exhibit 25A: Average Pass Through Rates

Name	Type	Application	Observations	Begin Date	End Date	Netz Estimated Average Pass-Through Rate	Willig Estimated Average Pass-Through Rate	Is Willig's Estimate of the Average Pass-Through Rate Statistically Significantly Different from 1?	R-Squared of Willig Estimate
Amazon	Internet Retailer	Monitors	2,592	1/2/2002	11/16/2011	1.04	0.88***	No	0.99
Amazon	Internet Retailer	Televisions	1,204	2/8/2002	1/7/2011	1.17**	0.52**	Yes	0.99
Arrow	Product Distributor	Monitors	922	11/24/1997	6/26/2006	1.09**	1.15***	Yes	0.99
BenQ America	Product Distributor	Monitors	1,265	11/2/1998	9/21/2005	1.12**	0.58***	Yes	0.98
Buy.com	Internet Retailer	Monitors	177	1/13/2002	1/28/2010	1.16**	1.22***	Yes	1.00
Buy.com	Internet Retailer	Televisions	122	9/27/2002	9/6/2010	1.05**	1.03***	No	1.00
CDW	Internet Retailer	Monitors	809	1/3/2006	1/8/2008	1.00	0.75***	Yes	1.00
CDW	Internet Retailer	Televisions	164	11/8/2005	3/29/2010	1.02	1.24***	Yes	1.00
Circuit City	Brick & Mortar Retailer	Monitors	7,860	4/1/1995	12/31/2007	--	0.95***	Yes	0.98
Circuit City	Brick & Mortar Retailer	Televisions	53,439	4/1/1995	12/31/2007	--	0.54***	Yes	0.99
Costco	Brick & Mortar Retailer	Monitors	301	12/16/1996	3/11/2006	1.07**	0.95***	No	1.00
Costco	Brick & Mortar Retailer	Televisions	3,676	9/3/1996	12/8/2007	1.07**	0.89***	Yes	1.00
Fry's	Brick & Mortar Retailer	Monitors	4,673	1/1/1998	10/21/2006	1.13**	0.95***	No	0.99
Funai	Product Manufacturer	Televisions	787	1/3/2005	7/28/2009	1.13**	0.34*	Yes	0.99
Gateway	Product Manufacturer	Monitors	161	1/5/1998	12/30/2004	1.12**	0.53***	Yes	0.99
Ingram Micro	Product Distributor	Monitors	10,885	12/31/2001	12/27/2010	1.02**	0.90***	Yes	1.00
Ingram Micro	Product Distributor	Televisions	492	12/31/2001	12/7/2010	1.03**	0.44*	Yes	1.00
OfficeMax	Brick & Mortar Retailer	Desktops	1,070	1/26/2003	12/1/2008	1.09**	0.80***	Yes	0.96
OfficeMax	Brick & Mortar Retailer	Monitors	1,561	1/26/2003	9/25/2007	1.01*	1.04***	No	0.94
PC Connection	Internet Retailer	Monitors	13,279	7/8/1999	10/29/2008	1.09**	0.87***	Yes	1.00
PC Connection	Internet Retailer	Televisions	120	2/5/1999	1/8/2007	1.06**	0.80***	No	1.00
PC Mall	Internet Retailer	Desktops	171	6/6/2002	3/7/2006	1.01	0.69***	Yes	0.99
PC Mall	Internet Retailer	Monitors	21,470	2/27/1994	6/18/2009	1.10**	0.90***	Yes	1.00
PC Mall	Internet Retailer	Televisions	423	9/24/1996	11/19/2009	1.12**	1.15***	No	1.00
Sam's Club (Retail)	Brick & Mortar Retailer	Televisions	87	8/13/2001	11/19/2005	0.98	1.09***	Yes	1.00
Sam's Club (Transaction)	Brick & Mortar Retailer	Televisions	87	9/8/2001	12/17/2005	1.13***	1.10***	No	1.00
Tatung	Product Manufacturer	Monitors	1,580	9/2/1998	10/31/2006	1.00	0.18***	Yes	0.99
TechData	Product Distributor	Monitors	4,075	11/3/1997	10/29/2007	1.00**	0.88***	Yes	1.00
TACP	Product Manufacturer	Televisions	9,510	4/1/1995	3/31/2006	1.12**	0.12	Yes	0.99
TAIS	Product Distributor	Monitors	773	11/1/1996	4/1/2005	1.12	0.60	No	0.93
Walmart (Retail)	Brick & Mortar Retailer	Televisions	353	6/23/2001	8/7/2010	1.10*	0.97***	No	0.99
Walmart (Transaction)	Brick & Mortar Retailer	Televisions	354	6/23/2001	8/7/2010	1.06***	0.89***	No	1.00
Walmart/Sanyo	Brick & Mortar Retailer	Televisions	216	12/1/1994	8/3/2009	1.16**	1.16***	Yes	1.00
Zones	Internet Retailer	Desktops	46	1/3/2000	4/1/2003	1.13**	0.85***	No	0.99
Zones	Internet Retailer	Monitors	1,576	1/3/2000	1/11/2008	1.04**	0.71***	Yes	0.99

Source: All relevant sales and procurement data for retailers listed.

Notes: See Exhibit 25B for notes.

Exhibit 25B: Notes on Average Pass Through Rates

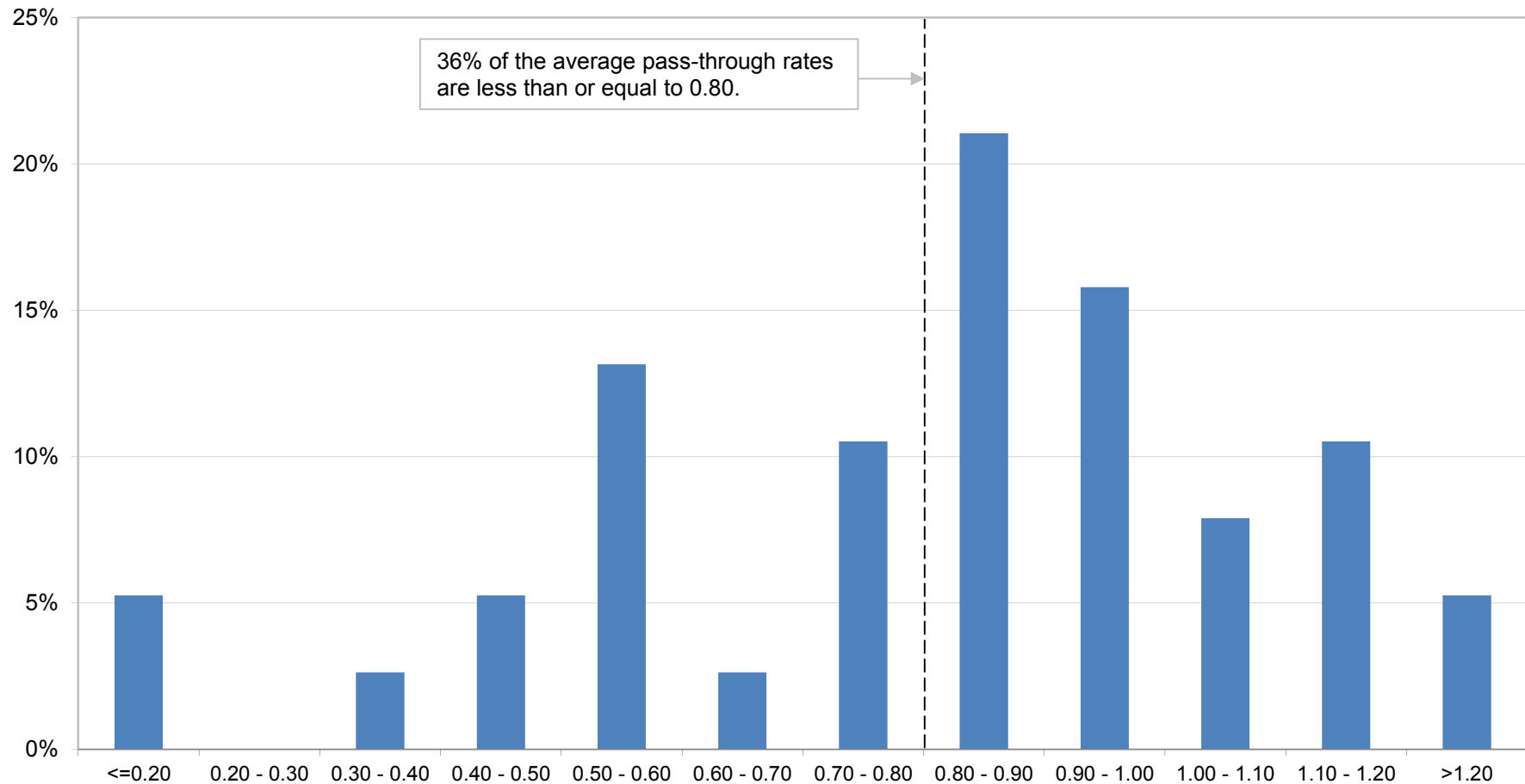
Notes:

- (1) See Appendix for details about data and regression models used to obtain Willig estimates of average pass-through rates;
- (2) Netz estimates of average pass-through rates were taken from Exhibit 34 of the Dr. Netz's Report;
- (3) The entities and associated datasets used in the regressions presented in this exhibit are based on the datasets used in Exhibit 34 of the Netz Report (aggregated to the monthly level), with two exceptions: Ingram Micro and TACP. For details, see Section C of the Appendix;
- (4) The following entities' datasets (included in Exhibit 34 of the Netz Report) were excluded from the analysis for reasons explained in Section G of the Appendix: Dell Monitors, Best Buy and Toshiba America Electronics Corporation;
- (5) See Appendix for details on robustness checks, which produce qualitatively similar results;
- (6) (***) indicates that the estimated coefficient is different from zero at the 0.1% significance level. (**) indicates that the estimated coefficient is different from zero at the 1% significance level. (*) indicates that the estimated coefficient is different from zero at the 5% significance level.

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Exhibit 26: Dispersion of Average Pass-Through Rates in Third-Party Data

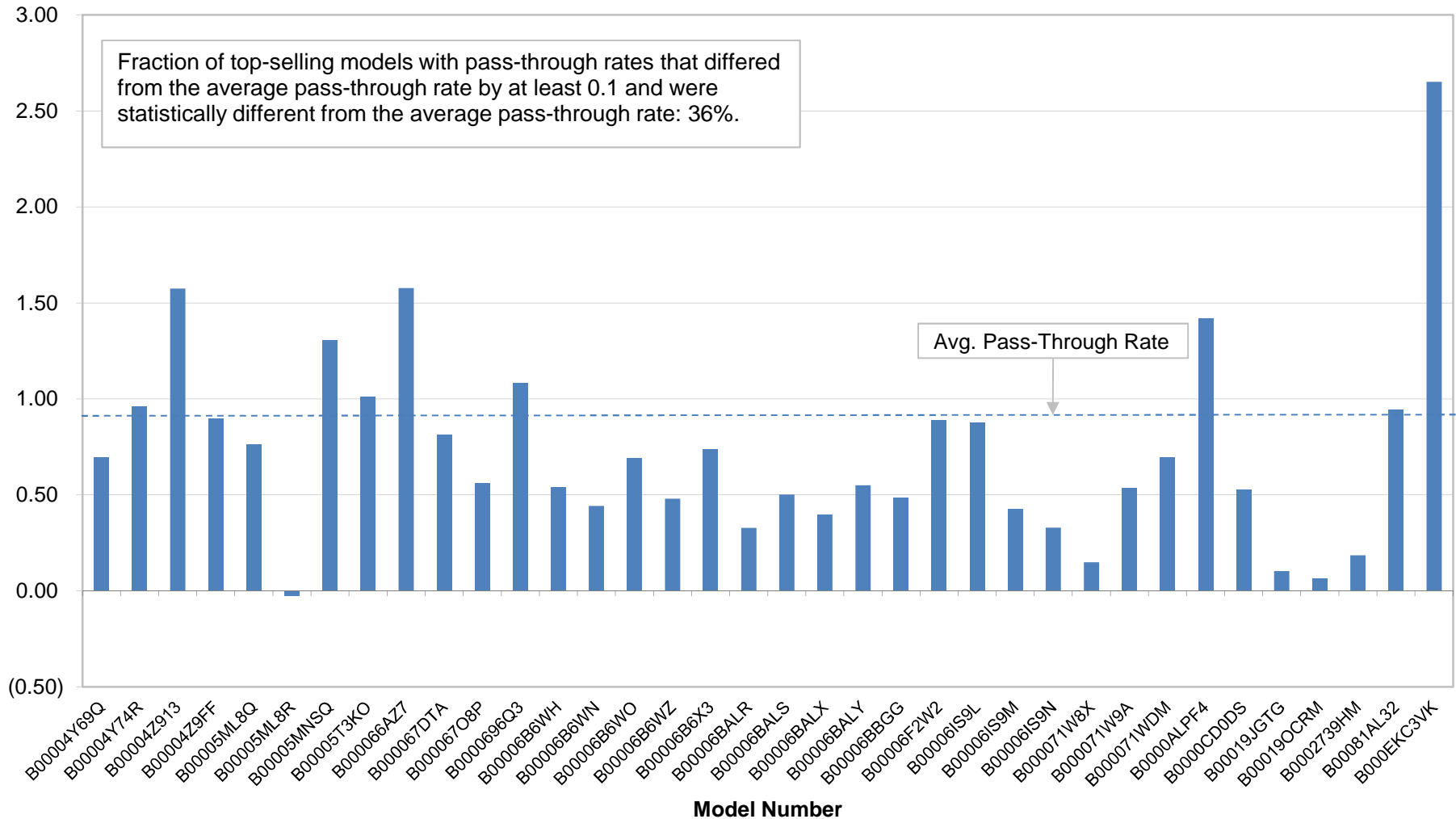
Percent



Source: Exhibit 25A.

Notes: (1) Of the 33 estimated average pass-through rates reported in Exhibit 25A, 12 are less than or equal to 0.8; 11 of these 12 are statistically significantly different from 1 at the 5% level; (2) Exhibit 25A includes two average pass-through rates estimates each for Walmart and Sam's Club. Only the higher estimate for each of these entities is represented in this exhibit; (3) See Exhibit 25B for notes regarding the estimation of the average pass-through rates presented in this exhibit..

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Exhibit 27A: Amazon Monitors Pass-Through Rates by CRT Monitor Model**Pass-Through Rate**

Source: Amazon sales and procurement data.

Note: See Exhibit 27B for notes.

Exhibit 27B: Notes on Amazon Pass-Through Rates by CRT Monitor Model

Notes:

- (1) See Appendix for details about the data and regression model used to estimate pass through rates;
- (2) The dataset used in the regressions was compiled in the same manner as the dataset used in the analysis presented in Exhibit 34 of the Netz Report (aggregated to the monthly level);
- (3) The regression included all of the products in the dataset; the chart presents the estimated pass-through rates for Amazon's top-50 selling monitors, provided they were sold for 18 months or more.

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Exhibit 28A: List of Third Party Datasets Used

Third Party Name	Distribution Chain Level	Product(s)	Price Description	Synchronized	Unsynchronized	
					Cost Description	Netz Cost Aggregation
Amazon	Internet Retailer	Monitors, Televisions	Transactions Level Prices	X	-	-
Arrow Electronics	Product Distributor	Monitors	Transactions Level Prices	X	-	-
BenQ America	Product Manufacturer	Monitors	Transactions Level Prices	X	-	-
Best Buy	Brick & Mortar Retailer	Monitors, Televisions	Transactions Level Prices	X	-	-
Buy.com	Internet Retailer	Monitors, Televisions	Transactions Level Prices	X	-	-
CDW	Internet Retailer	Monitors, Televisions	Transactions Level Prices	-	Transactions Level Costs	Monthly Average Costs
Circuit City	Brick & Mortar Retailer	Monitors, Televisions	Monthly Average Prices	X	-	-
Costco	Brick & Mortar Retailer	Monitors, Televisions	Transactions Level Prices	-	Transactions Level Costs	Weekly Average Costs
Fry's	Brick & Mortar Retailer	Monitors	Transactions Level Prices	X	-	-
Funai	Product Manufacturer	Televisions	Transactions Level Prices	-	Transactions Level Costs	Monthly Average Costs
Gateway	Internet Retailer/Manufacturer	Monitors	List Prices	-	Transactions Level Costs	Daily Average Costs
Ingram Micro	Product Distributor	Monitors, Televisions	Transactions Level Prices	X	-	-
OfficeMax	Brick & Mortar Retailer	Desktops, Monitors	Transactions Level Prices	X	-	-
PC Connection	Internet Retailer	Monitors, Televisions	Transactions Level Prices	-	Transactions Level Costs	Weekly Average Costs
PC Mall	Internet Retailer	Monitors, Televisions	Transactions Level Prices	-	Transactions Level Costs	Weekly Average Costs
Sam's Club (Retail Prices)	Brick & Mortar Retailer	Televisions	Weekly Average Retail Prices	X	-	-
Sam's Club (Transaction Prices)	Brick & Mortar Retailer	Televisions	Transactions Level Prices	-	Weekly Average Costs	Weekly Average Costs
Tatung	Product Manufacturer	Monitors	Transactions Level Prices	-	Transactions Level Costs	Monthly Average Costs
Tech Data	Product Distributor	Monitors	Transactions Level Prices	-	Transactions Level Costs	Monthly Average Costs
Toshiba America Consumer Products (TACP)	Product Manufacturer	Televisions	Transactions Level Prices	X	-	-
Toshiba America Electronics Corporation (TAEC)	Tube Distributor	CDTs, CPTs	Transactions Level Prices	-	Transactions Level Costs	Monthly Average Costs
Toshiba America Information Systems (TAIS)	Product Distributor	Monitors	Monthly Average Prices	-	Transactions Level Costs	Monthly Average Costs
Walmart (Retail Prices)	Brick & Mortar Retailer	Televisions	Weekly Average Retail Prices	X	-	-
Walmart (Transaction Prices)	Brick & Mortar Retailer	Televisions	Transactions Level Prices	-	Weekly Average Costs	Weekly Average Costs
Walmart/Sanyo	Brick & Mortar Retailer	Televisions	List Prices	X	-	-
Zones	Internet Retailer	Desktops, Monitors	Transactions Level Prices	X	-	-

Notes: See Exhibit 28B for notes.

Exhibit 28B: Notes on List of Third Party Datasets Used

Notes:

- (1) "Synchronized" refers to entities for which the sales data include a cost field that represents a measure of cost associated with each sales price observation;
- (2) Entities that were not synchronized produced procurement cost data separately from the sales data;
- (3) The column titled "Netz Cost Aggregation" identifies the level at which Dr. Netz averaged (aggregated) costs for use in her pass-through regressions;
- (4) Walmart and Sam's club "retail data" include weekly cost for each item and suggested retail price for each item;
- (5) Walmart and Sam's "transaction data" include actual transaction prices;
- (6) Walmart and Sam's Club sales include only the sample of stores and TVs that Dr. Netz used in the analysis presented in Exhibit 34 of her report;
- (7) Walmart/Sanyo data include annual manufacturer suggested retail prices for Sanyo TVs sold by Walmart. These data also include "FOB Cost" (Walmart's purchase cost from Sanyo).

EXHIBIT 36

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

IN RE: CATHODE RAY TUBE (CRT)
ANTITRUST LITIGATION

Master File No. CV-07-5944-SC

MDL No. 1917

This Document Relates to:

ALL INDIRECT-PURCHASER ACTIONS

**REBUTTAL DECLARATION OF JANET S.
NETZ, PH.D., IN SUPPORT OF MOTION OF
INDIRECT-PURCHASER PLAINTIFFS FOR
CLASS CERTIFICATION**

Date: TBD
Time: TBD
Courtroom: Hon. Charles A. Legge (Ret.)
Special Master

The Honorable Samuel Conti

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AND CHAMBERS COPY

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I. Qualifications

I, Janet S. Netz, am a founding partner of applEcon, LLC. Plaintiffs' counsel asked me to determine whether the Defendants' alleged conduct had common or class-wide impact on the members of the proposed class and whether computation of the damages suffered by the class members as a result of Defendants' alleged conduct is susceptible to common proof on a formulaic basis. My education, skill, and experience qualify me to undertake the necessary economic research into the facts and data of the case to provide reliable answers to the proposed questions.

I have been a tenured Associate Professor of Economics at Purdue University and a Visiting Associate Professor at the University of Michigan. I received a B.A. (1986) from the University of California, Berkeley, *cum laude*, and an M.A. (1990) and Ph.D. (1992) from the University of Michigan, all in the field of economics. My doctoral fields were Industrial Organization, which is the study of firms and markets, the economic field most closely related to the issues in this case specifically and in antitrust generally, and International Trade, which includes the study of firms and markets in a global environment.

Among the courses that I have taught, those that are most closely related to the issues of this case include Industrial Organization at the undergraduate and doctoral level; Antitrust and Regulation at the undergraduate level; Microeconomic Theory at the undergraduate and master's level; and International Trade at the undergraduate and master's levels. I have guest lectured on the role of an economic expert in an Alternative Dispute Resolution class at the University of Michigan Law School. I have spoken on the role of economists and economics in class action antitrust cases at several American Bar Association conference programs. My research has focused on competitive interactions of firms and strategies firms can use to increase profits. I have published in peer-reviewed, scholarly journals and have presented my research at many conferences and seminars. A detailed account of my academic employment and publication histories is provided in my curriculum vitae, which is attached as Exhibit A.

I have consulted on numerous antitrust cases and have testified on class certification or class decertification issues. I have also testified in trial or by affidavit or declaration, especially with regard to the determination of the impact of anti-competitive conduct on consumers and quantifying the magnitude of the impact, for over ten years. A list of the cases on which I have testified and consulted is provided in my curriculum vitae, which is attached as Exhibit A.

II. Assignment

I have been asked by Plaintiffs' counsel to reconsider my conclusions regarding the economic effects of Defendants' allegedly illegal conduct in light of Defendants' expert Prof. Willig's report. The relevant economic questions remain whether Defendants' conduct had common or class-wide impact on the members of the proposed class and whether computation of the damages suffered by the class members as a result of Defendants' alleged conduct is susceptible to common proof on a formulaic basis.

Again, I undertake my analysis on the assumption that liability will be proven. That is, I assume that Plaintiffs will prove that Defendants conspired to jointly set the price of CRT tubes, as Plaintiffs allege. While I assume that the allegations in the Complaint are true, I also investigate evidence regarding the operation of the cartel in order to evaluate whether such an alleged cartel

would be effective. I did not come across evidence that was broadly contradictory to the allegations in the Complaint.

My staff, under my guidance, and I have reviewed numerous materials on which I base my conclusions. To the best of my ability, I have kept track of the confidential and public materials reviewed since my initial report was filed 1 October 2012 in Exhibits B and C, respectively. I reserve the right to revise my conclusions and opinions as more information comes to light.

III. The relevant economic questions for class certification

The relevant economic questions for class certification derive from Federal Rule 23(b)(3): *inter alia*, a class action can be certified if “the court finds that the questions of law or fact common to class members predominate over any questions affecting only individual members”. To provide information to the court regarding the predominance of common factors, I investigate whether the CRT cartel’s anticompetitive conduct caused harm to all members of the putative class and whether damages can be calculated using a common, formulaic method. The harm alleged by Plaintiffs consists of overcharges; that is, prices that were higher than they would have been absent the cartel’s challenged conduct; in a word, that prices were “supracompetitive”.¹

Thus, to evaluate the existence or magnitude of harm caused by a price-fixing cartel, the appropriate comparison is between the actual price – that is, the price that we observe in the presence of the cartel – and the but-for price – that is, the price that we do not observe that would have occurred in the absence of the cartel.²

Care must be taken to avoid confusion between two different concepts regarding prices that are often described using similar language; one of the concepts is central to class certification, but the other is not. The notion central to class certification is whether the price that is observed (which I often refer to as the actual price) is higher than the price that would have occurred had the cartel not engaged in the price-fixing conduct. The seemingly similar concept is how prices that are observed change over time. The actual price can be above the but-for price at the same time that the actual price increases, decreases, or remains stable over time. The words “increase in price” could mean “the cartel increased the actual price relative to the but-for price” or it could mean “the price in February was greater than the price in January.” I attempt to be precise in the exposition to avoid confusing the court.

Prices change over time for many reasons, including (but not exclusively) the exercise of market power, and multiple influences can occur at the same time. For example, the observation that competition from LCD and plasma flat panel displays caused CRT prices to decline over time is, on its own, uninformative as to the existence and magnitude of impact caused by the exercise of market power; it does not mean that prices are not supracompetitive. Prof. Willig agrees that a

¹ Netz, Janet S., 01 October 2012, Declaration of Janet S. Netz, PH.D., In Support of Motion of Indirect-Purchaser Plaintiffs For Class Certification, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division) (Hereinafter “Original Report”), Section IV.

² Throughout the rebuttal report, and in my original report, I use the term “actual” to specify the outcome in the cartelized world that we observed. It is the counterpart to the term “but-for”.

cartel can be operating effectively even if prices are observed to fall over time.³ However, some of his statements must be read carefully to avoid confusing mere changes in price over time with evidence regarding whether prices are supracompetitive.⁴

IV. Summary of my testimony

Prof. Willig and Defendants' counsel routinely mischaracterize my testimony in his expert report and their Memorandum in Opposition to Class Certification, respectively.⁵ I therefore summarize my testimony thus far so that the reader understands the conclusions to which I have actually testified, as well as the foundation for those conclusions.

A. Conclusion: The cartel charged higher prices to direct purchasers than would have occurred in the but-for world

I first evaluated whether the alleged cartel operated in the CRT industry and in such a way that it would successfully raise prices above their competitive level. I conclude that the cartel charged higher prices to direct purchasers than would have occurred in the but-for world. I based my conclusion on the following analyses:

- I examined the characteristics of the CRT industry that are relevant to successful price-fixing. The relevant facts include Defendants' dominant share of the capacity to make CRTs; limited alternative display technologies available for monitors and TVs for much of the damages period; and barriers to entry.⁶
 - Based on this evidence, I find that the cartel possessed the ability to jointly increase the price of CRTs above the competitive level.

³ Prof. Willig acknowledges that when prices are trending downward, the effective exercise of market power "prevents prices from falling as far as they would have absent the cartel or as quickly." 24 January 2013, Deposition of Robert R. Willig (Hereinafter "Willig Dep."), pp. 41:14 - 42:23.

⁴ See Section VII.E.6 for several examples of statements that sound like statements about whether prices are supracompetitive, but are merely statements about prices changing over time.

⁵ See e.g.,

- Prof. Willig's testimony represents the price structure to which I testify as being rigidly unchanging over time, "inconsistent with" heterogeneous prices, and requiring that relative prices never change. Willig, Robert D., 14 December 2012, Expert Report of Robert D. Willig, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division) (Hereinafter "Willig Report"), ¶14, Willig Dep., p. 126:13-23. I explain that this is a mischaracterization in Section VII.E.
- "Further, contrary to the assertion by Dr. Netz, vertical integration was not uniform in the CRT industry." 17 December 2012, Defendants' Memorandum of Points and Authorities in Opposition to Motion of Indirect-Purchaser Plaintiffs For Class Certification, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)(Hereinafter "Memo in Opp."), p. 10:3-4. I said explicitly "Some members of the CRT cartel were vertically integrated." Original Report, p. 12.

⁶ Prof. Willig agrees that there are barriers to entry. Willig Report, ¶87.

- I examined the documentary and testimonial evidence related to the operation of the cartel, including types, attendees, and frequencies of cartel meetings and the topics that were discussed at cartel meetings and other forms of communications among Defendants.
 - Based on this review of the evidence, I find that the CRT cartel engaged in practices that have enabled other cartels to successfully raise price, including restricting capacity, sharing information, and monitoring prices.
- I evaluated direct evidence of the cartel's success, including contemporaneous statements by cartel members describing the cartel's success.
- I evaluated the impacts of the cartel's conduct on the firm. Any firm that participates in a cartel risks substantial monetary costs and incarceration of firm executives, since cartels are illegal in most of the developed world. A firm will therefore not participate in a cartel unless it expects to sufficiently increase profits that it would more than cover the expected costs of participation, including fines, damages, and incarceration. The participation of Defendants for up to thirteen years is indirect evidence that the cartel was successful in increasing the price of CRTs.⁷

Based on the evidence and analyses just summarized, I found that the cartel activities led to a price to direct purchasers that was higher than it would have been but for the cartel.

B. Conclusion: The cartel impact was common across direct purchasers in the form of higher prices

I next evaluated whether the impact of the alleged cartel was the same for all direct purchasers. I conclude that the cartel charged higher prices to all direct purchasers; in other words, that the impact was common. Common impact can be inferred from the existence of a price structure, by which I mean that when a price structure exists, a cartel can cause all prices to be supracompetitive by setting a subset of prices.⁸

I based my conclusion on the following analyses:

- I examined cartel meeting notes and found that the cartel itself imposed a relationship across CRT prices by specifying price differentials for specific product characteristics. For example, the cartel specified that the target price for 15" CDTs would be \$15 above the price for 14" CDTs.⁹
- I conducted a regression analysis to identify the extent to which target prices were determined by common product characteristics. I found that 98% of the variation in target prices for CPTs was explained by the size, finish, and shape of the tube, whether the target was for a major customer, and a simple time trend. Similarly, I found that 91% of the variation in target prices for CDTs was explained by the size and finish of the tube, whether the target was for a major customer, and a simple time trend.

⁷ Not all Defendants were in operation for the entire damages period.

⁸ See Section VII.E.1.

⁹ Original Report, p. 67.

- I conducted a regression analysis to identify the extent to which actual prices were determined by common product characteristics. I found that 92% of variation in actual CDT prices and 96% of variation in actual CPT prices was determined by size, aspect ratio, finish, buy-seller pairs, and a time trend.

Based on these analyses, I conclude that the impact of the cartel on direct purchasers was common: all direct purchasers faced higher prices because of the cartel.

C. Conclusion: The overcharge was passed on to indirect purchasers, causing common impact on class members in the form of higher prices

I next considered whether the common impact imposed on direct purchasers would be passed through to all class members, causing common impact to class members.

- I examined evidence relating to how CRTs make their way from Defendants' factories to class members' hands, including the steps of distribution and the degree of competitiveness of the distribution channel.
- I examined the economic literature on pass-through and applied it to the facts of the case, including the intense competition in the distribution channel, pricing diversity, and various pricing strategies.
 - Intense competition means that resellers will pass-through the overcharge. Pass-through is consistent with the existence of price differences and different price strategies.
- I examined the documentary evidence, which showed that market participants, including Defendants, recognize that CRT price changes are passed through to retail CRT product prices.

Based on these analyses, I conclude that the overcharge was passed through to class members.

D. Conclusion: The overcharge can be calculated using a common method based on common evidence

I next considered whether the overcharge imposed on direct purchasers could be measured using a common method and common evidence. I understand that it is not necessary that the overcharge be actually measured at this stage of the proceedings, but rather to provide the judge with evidence regarding whether common issues predominate over individual issues.

- I evaluated a variety of methods that have been used to calculate the impact on price of price-fixing in other settings to determine whether the facts of the price-fixing allegations and the industry characteristics in this case would allow different methods to be appropriately implemented.
- I investigated whether the data would be available for the implementation of various overcharge models. I looked at data available from Defendants, market research firms, the government, and other third parties.

Based on these analyses, I conclude that there are several methods that are applicable to the facts of the case and for which the necessary data are available. These methods would be implemented in the same way, regardless of whether the plaintiff were an individual or a class.

E. Conclusion: The pass-through rate can be calculated using a common method based on common evidence

Finally I considered whether the pass-through rate could be calculated using a common method based on common evidence.

- I worked with lawyers to obtain sales data from all levels of the distribution channel and from all types of resellers that contained the requisite information needed to calculate pass-through rates for each reseller and for each CRT application.
- I conducted 40 studies of pass-through for different firms involved in the distribution of CRTs and CRT products and for CDTs and CPTs separately. The results of all of these pass-through studies give pass-through rates of at least 100%. If pass-through is at least 100% at each stage of the distribution channel then the entire overcharge was passed through to class members.

I conclude that the pass-through rate can be calculated using a common method and common evidence.

V. Summary of Prof. Willig's claims

Prof. Willig's claims fall under four major topics: price structure, cartel effectiveness, pass-through, and but-for CRT prices. First, Prof. Willig claims that "Dr. Netz's 'price structure' theory is inconsistent with the heterogeneity and diversity observed in the CRT pricing data during the class period."¹⁰ When examining the cartel's effectiveness, Prof. Willig concludes that "the evidence strongly indicates that the alleged cartel was not uniformly effective in elevating prices."¹¹ Prof. Willig claims that my pass-through rate calculations are incorrect¹² and average pass-through rates are unreliable for proving that the cartel had class-wide impact.¹³ His final claim is that I failed to establish that my common methods for calculating but-for CRT prices are feasible and reliable.¹⁴

VI. Prof. Willig's analyses provide unreliable evidence for assessing commonality

I have reviewed Defendants' expert Prof. Willig's report. I find the conclusions offered by Prof. Willig to be largely irrelevant and unreliable for addressing whether Defendants' conduct had common or class-wide impact on the members of the proposed class. I also find the conclusions offered by Prof. Willig to be unreliable for evaluating whether computation of the damages suffered by the class members as a result of Defendants' conduct is susceptible to common proof on a formulaic basis. In particular, I find that Prof. Willig has relied upon analyses that ignore important aspects of the data, and that these oversights yield findings that are biased in a direction favorable to Defendants and that are inconsistent with record evidence. Moreover,

¹⁰ Willig Report, ¶14.

¹¹ Willig Report, ¶26.

¹² Willig Report, ¶33.

¹³ Willig Report, ¶34.

¹⁴ Willig Report, ¶160.

many of Prof. Willig's analyses, even if they had been implemented correctly, fail to provide a sufficient basis for his conclusions. The recurrent oversights and methodological flaws in Prof. Willig's analyses also extend to his attempts to rebut the conclusions I offered in my class certification declaration.

Two lines of analyses are central to Prof. Willig's conclusion that commonality is implausible – his analyses of price differences across CRTs and his analyses of CRT price changes.¹⁵ I now detail the ways in which the evidence Prof. Willig presents regarding CRT price diversity and CRT price changes rely on methodological flaws that bias the results in ways that grossly exaggerate the degree of price diversity and yield unreliable measures of CRT price changes. I also explain why, even if Prof. Willig had implemented the analyses correctly, his findings do not preclude common impact and thus provide an unreliable basis for his conclusion.

A. Prof. Willig's evidence on price diversity is unreliable for assessing commonality

In my class certification declaration, my analysis of the Defendants' data showed that the same small number of common factors – application, size, date, aspect ratio (widescreen), and finish – explain the majority of the variation in prices.¹⁶ This indicates a large degree of commonality across purchasers of CRTs: most of the price difference between two purchasers of CRTs at a given point in time is explained by these common product characteristics.

My finding on this point – that the majority of price variation is explained by common factors – is not rebutted by Prof. Willig. Rather, Prof. Willig argues that there is a vast range of products at issue with a vast range of prices and price variation.¹⁷ Prof. Willig's evidence is unreliable, and when properly examined reveals a relatively small degree of diversity.

1. Prof. Willig exaggerates CRT price dispersion by ignoring quantities

In Exhibit 1A, Prof. Willig graphs monthly prices for each CRT model sold to a specific customer by a particular Defendant. For example, the dot circled on Exhibit 1 at about \$743 in October 1995 represents an observation of 16 units of model “W76KYR690X96(B),PN”, a 32" widescreen ITC CPT, sold by Toshiba to an unidentified customer, while the dot circled at about \$50 in January 2004 represents an observation of 2,016 units of model M41AJR93X76, a 17" ITC CDT with a 4:3 aspect ratio, sold by Chunghwa to BenQ.

Prof. Willig greatly exaggerates price dispersion in his Exhibit 1A, masking the degree of commonality present. The exaggeration occurs because Prof. Willig does not account for the

¹⁵ See, e.g.,

- “Despite the substantial variation in product and other characteristics affecting CRT prices and the clarity of the data regarding the wide dispersion in CRT price levels and changes, Dr. Netz claims that CRT prices exhibited a ‘structure’.” Willig Report, p. 29 and ¶70.
- “This kind of variation in price movements makes it implausible that antitrust impact to all direct and indirect purchasers in the U.S. could be proven on the basis of a ‘price structure’ theory.” Willig Report, p. 8 and ¶21.

¹⁶ The product characteristics including date of sale explain 71.1% of the variation in prices for CDTs and 88.8% of the variation in prices for CPTs. Original Report Exhibits 21 and 22.

¹⁷ Willig Report, ¶15.

quantity of CRTs sold at a particular price; quantity is a crucial factor in the assessment of whether common factors or individual factors predominate. In fact, it is impossible to assess commonality without considering quantities. Consider the following example. Assume that in a given time period there are ten transactions of interest in a class certification proceeding: one transaction of 991 units at a price of \$50 and nine transactions of one unit each at prices of \$10, \$20, \$30, \$40, \$60, \$70, \$80, \$90 and \$100. Graphically illustrating these transactions as Prof. Willig does in his Exhibit 1A would suggest great variation, with transactions appearing to be equally scattered between \$10 and \$100. Such a graph would suggest that prices were very diverse across potential class members, when, in fact, all but nine of the one thousand units sold (that is, less than 1.0%) were sold at a single price. A graph that did not indicate the quantity sold at each price would completely obscure the degree of commonality in the market.

Prof. Willig's Exhibit 1A suffers the flaw just described. The exhibit plots the date and price of essentially every transaction in the Defendants' data, over 130,000 transactions in all. But it plots only the date and price: an August 2001 sale of 13 units at \$209 appears the same on the graph as does an August 2001 sale of over 117,000 units at \$46.67.¹⁸ The *ten* largest transactions underlying Prof. Willig's Exhibit 1A total more unit volume than the *smallest* 30,000 transactions shown. Nearly 14,000 transactions in the chart are for 100 units or fewer. These are presented as if each is as relevant for assessing commonality as the largest 14,000 transactions, each of which accounts for over 18,000 units. Combined, the largest 14,000 transactions represent over 580,000,000 units, well over half of the total unit volume at issue, and nearly one thousand times as many consumers as were affected by the smaller transactions. Ignoring quantity precludes a considered evaluation of commonality.

To illustrate the degree to which Prof. Willig's Exhibit 1A obscures price commonality across CRT consumers, I present some graphs showing prices and quantities purchased at those prices for sales in August 2001.¹⁹ Exhibit 2, as will all of the exhibits in this series of exhibits, shows a range of prices on the horizontal axis (sometimes called the X-axis) and shares of the CRTs covered by the exhibit on the vertical axis (sometimes called the Y-axis). The height of the column for any price range indicates the share of all products covered by the exhibit that sold in that particular price range. To facilitate comparability with Prof. Willig's Exhibit 1A, I keep the \$0 to \$800 scale he uses on the horizontal axis. Exhibit 2 includes *all* CRTs. The tallest column, at price range \$40-50, indicates that 29.4% of *all* CRT sales reflected in Defendants' data for August 2001 were priced in a narrow \$10 band between \$40 and \$50. The exhibit also shows that less than 5% (the total of each of the bars past \$170) of CRTs were sold for over \$170.

Although Prof. Willig agrees CDTs and CPTs are not economic substitutes,²⁰ he includes both types of CRTs in his Exhibit 1A. The results, when common factors causing price differences are controlled for, are remarkably less dispersed. In Exhibit 3, I include only CPTs. This exhibit

¹⁸ The exhibit further exaggerates individuality because it invisibly stacks contemporaneous transactions having the same price or very similar prices. For example, in August 2001, the two transactions with prices between \$399 and \$400, combining for 768 units, appear to have the same weight as the 34 transactions priced between \$49 and \$50 and involving over 350,000 units.

¹⁹ I chose this month merely because Prof. Willig used it as an example in his report. Willig Report, ¶15. At his deposition, Prof. Willig said there was no particular reason he chose this month. Willig Dep., pp.78:15 - 79:18.

²⁰ Willig Report, ¶40.

looks relatively similar to the overall CRT market chart in Exhibit 2. That is, most CPTs are sold within a relatively small range of prices. Following Prof. Willig's example, I examine the three sizes that each comprise in excess of 10% of CPT sales: 14", 20"/21" and 29".²¹ I next examine 14" CPT sales in August 2001. These sales were extremely concentrated: Exhibit 4 shows that roughly 85% of 14" CPTs were sold at prices between \$20 and \$30.²² However, even this chart exaggerates the degree of price dispersion among 14" CPT. In Exhibit 5, I present the distribution of 14" CPTs, but on a scale showing \$1 increments from \$10 to \$40 and with the tubes separated by finish. In August 2001, the target price for bare 14" CPT was \$26.50; almost 70% of bare 14" CPT sold at prices from \$25.00 to \$26.99 and 89% were between the \$24.00 and \$27.99. ITC 14" CPT were similarly concentrated, with over 50% sold between \$28.00 and \$28.99 and almost 93% between \$28.00 and \$31.99. In August 2001, 14" CPT comprise 29% of all CPT sales in the Defendants' data. Exhibit 6 shows the distribution of unit volume for 20" and 21" CPTs.²³ These CPTs are sold exclusively at prices between \$20 and \$90. Controlling for shape causes an almost complete separation into two, narrow, price groups; see Exhibit 7. Lastly, Exhibits 8 and 9 present the prices of 29" CPT, with shape indicated in the latter exhibit.

An examination of CDT prices for August 2001 yields similar results. Exhibit 10 shows that most of the CDT volume was sold within an even smaller price band than CPTs. As with CPTs, Exhibits 11-13 show that looking at specific sizes, 14", 15" and 17", of CDTs results in very narrow price bands.²⁴

These exhibits allow us to reconcile the *apparent* disagreement between my analysis showing that the common factors of application, size, and shape account for the majority of the price dispersion, and Prof. Willig's Exhibit 1A that he claims shows a lot of price dispersion:²⁵ Prof. Willig's Exhibit 1A exaggerates differences and masks commonality because it includes all price diversity, whether or not the price differences are explained by common factors and ignores quantity, information that is critical for assessing whether common or individual factors predominate.

2. Prof. Willig exaggerates product differentiation by failing to consider the economic significance of product characteristics

Prof. Willig claims that the price dispersion of CRTs shown by his Exhibit 1A is the result of numerous characteristics that differentiate CRTs.²⁶ He says CRTs differ not only across application, size, and shape, but also across resolution, finish, masks, electrical properties, frequency, glare, and connection points between the CRT and the external casing of the finished

²¹ Willig Report Exhibit 11B, note (7).

²² The cartel set \$26.50 as the target price for 14" CPTs for August 2001. Samsung SDI, LG, et al., 26 June 2001, Visitation Report, CHU00036414 - CHU00036415 at 6415E.

²³ I grouped 20" and 21" CPTs on the same exhibit because the Defendants consistently discuss them together. From the pricing and the treatment of the tubes in Defendant documents, they appear to be very close substitutes.

²⁴ These are the sizes considered by Prof. Willig in his Exhibit 10B, note (7) and, combined, comprise 82% of all CDT sales.

²⁵ Willig Report, ¶44.

²⁶ Willig Report, ¶15.

product.²⁷ He asserts that “each CRT model was designed to fit the specific technical requirements of a particular finished product requested by a customer.”²⁸

Prof. Willig overstates the importance of differentiation across CRTs to issues of commonality. CRTs were generally *not* designed for a specific customer nor heavily customized for each purchaser. Rather, CRT manufacturers each had a limited number of major product designs, which they could alter in various minor ways. A given minor alteration was typically sold to multiple customers. Furthermore, the minor variations generally have quite limited price differentials across them. This is readily seen by examining the Defendants’ sales data.

The sales data show that a small number of model families of CRTs accounted for a disproportionate share of CRT sales during the class period. By model family, I refer to groups of CRTs which share the same major characteristics. Following industry practice, I identify families of CRTs based on the first six characters of the Worldwide Type Designation System (“WTDS”) model numbers assigned to CRTs. These characters denote the application, aspect ratio, screen size, and major design classification of the CRT.²⁹ To determine whether some product families are more economically relevant than others, I calculated the share of identifiable unit sales accounted for by each product family for each year and Defendant.³⁰ I then aggregated these shares for the top five product families in each year and for each Defendant. The results can be found in Exhibit 14. Over 20% of the time, the five top-selling product families account for 100% of total units sold in that year for that Defendant for that application. About 60% of the time, the five top-selling product families for a Defendant in a particular year accounted for 95% or more of total units sold in that year. From this result, it is clear that a relatively small number of product families were of major economic significance.

With this sort of sales dominance by a small number of product families, it is apparent a few product families – the few dominant major design classifications – were marketed widely across customers. That is, a single CRT design was sold to many customers. The WTDS codes in the sales data reveal that even at the finest level of granularity tracked by the system, many tubes, possibly most, were sold to multiple customers.^{31,32} For example, the Chunghwa 14" CDT with

²⁷ Willig Report, ¶¶39-42.

²⁸ Willig Report, ¶42.

²⁹ The first character of the WTDS code indicates the application and aspect ratio (wide-screen vs. normal) of the model. The second and third characters indicate the diagonal length of the screen in centimeters. The fourth, fifth, and sixth characters give the major design classification, which includes characteristics such as deflection angle, neck diameter, shape, mask pitch, and electron gun information. Industry sources refer to these as delineating the product family. Matsushita Toshiba Picture Display, 28 December 2004, Project Name Registration Standard, MTPD-0347731 - MTPD-0347738 at 10. Samsung SDI Germany, February 2001, Samsung A68QCP891X430 at 4. MT Picture Display, 12 December 2001, D0753-101, MTPD-0652301 - MTPD-0652307 at 2304E – 2305E.

³⁰ Identifiable sales are those with CRT model identifiers that use WTDS. Neither Panasonic nor Samsung are included in this analysis because neither contain enough observations with identifiable families. The Panasonic data include WTDS codes for only 34.4% of observations and the Samsung data does not include WTDS codes at all.

³¹ The full WTDS code can include detail down to the location of the mounting lags (the part that mates the CRT to the TV or monitor chassis and bezel). Undated, Picture Tube: Fourth Number, MTPD-0652322 - MTPD-0652339.

³² The following evidence is anecdotal, rather than a quantitative analysis of the degree to which individual product variations are sold to multiple customers. A full quantitative analysis is precluded because the Defendants’ sales data, even within a single manufacturer, are rarely perfectly consistent in terms of customer names. If I merely

WTDS family code M34AFA sold over 45 million units during the class period.³³ Chunghwa sold over 18 million units of one specific variant, the M34AFA83.³⁴ This specific design was sold to in volume Tatung, Jean, Acer, Liteon, Philips, KDS, Shamrock, Calcomp, Sampo, Rivetel, Funai, LG, K Tronics, Samsung, Wyse, and other monitor manufacturers.³⁵ Less popular models were also sold to multiple customers:

- Chunghwa's A34AGT family of 14" CPTs was only slightly less popular than its M34AFA, with over 44.5 million units sold. One variant, the A34AGT13, comprised 96.6% of all units of the family. Another variant, the '14, accounted for 2.6% and the remaining 0.8% came from two more variants. The '13 variant was sold in volume to Orion Electric (OEC), Funai, Technos, Korat, Starlight, WET, Vestel, Skyworth, Konka, Philips, Highsonic, Aiwa, LG, Silver, Changhong, Beko, Toshiba, Sharp, Thomson, Sampo, Onkyo, and many others.
- The Philips A68AHD family of 29" CPTs sold over 1.5 million units, primarily internal sales to Philips' TV manufacturing business, but Sanyo, as well as Philips, bought the A68AHD32 variant while Sharp and NEC, again along with Philips, bought the A68AHD82 variant.
- Toshiba sold a total of 6.6 million units of its M41LLH family of 17" CDTs, 80.3% being the M41LLH507 variant, 17.6% were the '107 variant and the remaining 2.1% were the '07 variant. Although about 60% of the observations of the '507 variant do not indicate the customer, those that do reflect volume sales to Toshiba internal customers, Samsung, Sumitomo, and Iiyama.
- Panasonic/MTPD sold a total of 9.8 million units of the A51LYZ family of 21" CPTs, 97.6% of which were in three minor variations (A51LYZ395, '095 and '295). The family was sold in volume to Panasonic internal customers, as well as Haier, Hisense, Panda, Skyworth, TCL, Westlake, El Araby, Funai, Philips, Samsung, Orion, Sharp and Vestel, among others. The '395 variant was sold to Panasonic internal customers, as well as El Araby, Funai, Philips, Onida, JVC, Orion, Sharp, and Toshiba. The '095 variant was sold to internal customers, as well as Changhong, HiSense, Panda, TCL, Westlake, Philips, Samsung, Orion, Sharp, and Vestel, among others.³⁶

reported the count of distinct customer names for specific products, it is likely I would substantially overstate the number of distinct customers, which is anticonservative. I therefore draw my conclusions from the anecdotal evidence.

³³ This is not a randomly selected example. Rather, it is the most popular product family in the defendant data.

³⁴ Although I do not have decoders that allow me to tell the exact specifications of this product, the WTDS system makes it clear that products with the same major and minor design classification are the same design down to mask type, glass type, tint, and coatings.

³⁵ Each of the firms named purchased at least 90,000 units.

If I look even more closely, down to having the same deflection yoke installed, four different deflection yokes each had sales in excess of 3 million units and each was sold to many customers.

³⁶ MT Picture Display, 22 April 2011, MTPD-0122906, MTPD-0122906.

- Hitachi sold 1.28 million units of its M41KSX family of 17" CDTs. As with the Toshiba 17" CDT, the vast majority, 88.5%, were of one variant, the M41KSX683; four additional variants comprised the remainder of the sales. The '683 variant was sold to Eizo Nanao, LG Electronics, ADI, Capetronics, MAG, Philips, Amtran Technology, and Acer, among others.

These examples demonstrate that many CRTs are neither designed for a specific customer nor heavily customized for each sale: a basic design is sold to multiple customers, frequently with multiple customers sharing the identical minor variations as well. Not only are major design families, and even specific minor variations, sold to many customers, but the differentiators among minor variations tend to carry small price differences as well, as I explain in the next paragraph.

Many of the characteristics asserted by Prof. Willig, and some witnesses, as leading to the great degree of price variation are economically very minor differences.³⁷ This is apparent in the incremental charges described in meeting notes for various attributes. The product characteristics can be roughly grouped into three categories: finish, major price differentiators, and minor price differentiators. Finish – whether the tube shipped without or with the deflection yoke and related components installed; the former are referred to as bare and the latter as ITC – is different from the other two categories because it does not reflect differences in the CRT as acquired by potential class members. *All* tubes require ITC components, so finish is merely a matter of which entity is paid for the ITC components and their installation, the tube manufacturer or some other party, not a matter of whether this particular option is purchased.³⁸ The major price differentiators are size and shape.³⁹ These typically involve price premiums substantially larger than 10%, often several times that level. Minor price differentiators discussed in meeting notes include resolution,⁴⁰ frequency,⁴¹ safety standards,⁴² mask type,⁴³ and neck diameter.⁴⁴ The fact

³⁷ Willig Report, ¶15, 41 - 42.

³⁸ Original Report, p. 18.

³⁹ For example, flat CDTs carried a premium of about 18% to 20% when they were introduced ca. 2000, declining to a premium in the vicinity of 10% by 2005. See Target price-structure.xlsx (Produced for Netz Class Certification Rebuttal on 15 February 2013). Flat CPTs carried about a 30% premium as late as 2003, declining to the vicinity of 20% by late 2005. See Target price-structure.xlsx (Produced for Netz Class Certification Rebuttal on 15 February 2013).

⁴⁰ For example, in 1999 the increment from .28mm dot pitch to .26mm was \$5.00 on a 19" CDT (a product the notes indicate had a target price of \$155 at the time). Chunghwa Picture Tubes and LTD, 28 July 1999, Visitation Report, CHU00030807 - CHU00030815 at 0808.01E. A year later, the difference from .27mm dot pitch to .25mm dot pitch was \$2.00 on a 19" CDT. Chunghwa Picture Tubes and LTD, 26 May 2000, Visitation Report, Topic: CDT Market Information Exchange and Price/Production Volumes Review, CHU00031006 - CHU00031009 at 1007.01E.

⁴¹ The price increment from 85KHz to 95KHz was \$3.00 or less. Chunghwa Picture Tubes and LTD, 26 May 2000, Visitation Report, Topic: CDT Market Information Exchange. Price/Production Volumes Review, CHU00031006 - CHU00031009 at 1007.01E and Chunghwa Picture Tubes and LTD, April 2004, Time Schedule, CHU00660681 - CHU00660692 at 0689.

⁴² The premium for MPRII over simple glare/anti-glare coatings on 15" and 17" CDT was \$1.00 to \$2.50 in January 2004 and \$0.50 to \$1.00 in April 2004. See, e.g.,

- Samsung SDI, 28 October 2003, Schedule, SDCRT-0088773 - SDCRT-0088779 at 8777.

that only application, size, and shape were meaningful price differentiators inherently limits the number of economically meaningfully different products at issue to a relatively small number.

Documentary evidence likewise supports my conclusion that there is far less relevant product differentiation than claimed by Prof. Willig. The business analyses performed by CRT Defendants during normal business operations (that is, outside of cartel meeting notes) generally focus on a small range of product attributes.⁴⁵ Similarly, CRT manufacturers frequently considered only a few characteristics when examining per unit costs of CRTs.⁴⁶ This focus on a

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- Chunghwa Picture Tubes and LTD, 25 March 2004, Return-from-Abroad Trip Report, CHU00031240 - CHU00031247 at 1242E.

The premium for TCO vs. MPRII ranged from \$3.00 on 17" and 19" CDT in 1999 to \$1.00 by 2004. See, e.g.,

- Samsung SDI, 23 June 1999, Report on the results of the 5 CDT companies' management meeting (June 23), SDCRT-0086641 - SDCRT-0086645 at 6644E.
- Chunghwa Picture Tubes and LTD, 25 March 2004, Return-from-Abroad Trip Report, CHU00031240 - CHU00031247 at 1242E.

⁴³ Invar masks carried a \$1.00 to \$3.00 premium. Chunghwa Picture Tubes and LTD, 28 December 2004, Market Visitation Report (Glass Meeting), CHU00030505 at 0505.02E. MT Picture Display, 12 December 2005, MTPD-0580821, MTPD-0580821 at 0821.

⁴⁴ Mini-neck carried a \$1 discount on 15" CDT and a \$4 premium on 20" CPTs in 2000. Chunghwa Picture Tubes and LTD, 23 June 1999, Business Meeting Report, CHU00030787 - CHU00030794 at 0791.01E.

⁴⁵ See, e.g.,

- CPT market shares based on size, curvature, and aspect ratio. 05 March 2006, SR03 Market Update & Analysis, PHLP-CRT-006753 at 10 - 11.
- Spreadsheets of 2003 consumer CPT sales only mention size. LG Philips Displays, July 2003, Consumer CPT Sales 2003, LPD_00014598.
- Samsung's sales of CDTs by size. Liu, Chih-Chun (C.C.), Du, Ching-Yuan (Michael), et al., 06 October 1999, Subject: SDD's different size CDr sales statistics in Q3, CHU00028598 at 8598.01E.
- A graph of Chinese CPT exports to the United States considers only size ranges (small, medium, large, jumbo). Samsung SDI, December 2003, Samsung SDI, SDCRT-0203797 at 13.
- Prices by size and finish for CPTs; North American CDT production by size. Philips, 12 April 1999, Strategy Review 1999-2003 Region North America, PHLP-CRT-088450 at 17 - 57.
- Supply and production capacity for CDTs by size. Toshiba America Electronic Components, Inc., 21 July 1999, CDT & Monitor Demand Supply Analysis, TAEC-CRT-00065484.
- This document uses only size and finish when referring to costs, production, and sales of CPTs. LG, 2002, Input, LPD_00014093.

⁴⁶ See, e.g.,

- This document differentiates CPTs on size and shape (between the 32VFS (a flat square tube, which is not literally flat) and 32VRF M1 (a real flat tube)) when examining costs. LG, 2002, Master_Actual, LPD_00036154.
- This document gives CPT costs by size and curvature. LG Philips Displays, 11 July 2001, LPD_00031769, LPD_00031769.
- This document reports production costs by the factory location, finish, size, and Samsung's product family (e.g., DF – their DynaFlat product line – or Vixlim – their shallow-depth tube). For each size, there are at

small number of attributes is consistent with both my hedonic regression analyses that showed that target prices and actual prices were predominantly determined by a small number of product attributes and the evidence in Exhibit 14 that there are a few archetype products with a number of minor variations.

The last issue I address regarding Prof. Willig's comments on product differentiation are his comments about the degree of interchangeability of CRTs and the difficulty finished good producers have in changing from one CRT to another of similar major specifications. Prof. Willig creates the appearance that tubes from different manufacturers are not interchangeable by focusing on physical substitutability and ignoring the relevant issue – economic substitutability.⁴⁷ As I described in my original report,⁴⁸ “competition” among CRT manufacturers is for design wins: tube manufacturers compete by convincing CRT finished goods manufacturers to use their tube in a given finished product design. Once the finished good design is *finalized*, the finished good manufacturer cannot readily switch to an alternative CRT *for that specific finished good model*.

By focusing very narrowly on the physical ability of a finished good manufacturer to switch tubes for an existing finished good design, Prof. Willig completely avoids the two avenues where economic substitutability, and competitive pressures, would have occurred absent the cartel: during the design stage and, post-design-win, by the finished good vendor switching its focus to a different final good design that used a different vendor's tube. When a finished good manufacturer is in the design stage, the various CRTs available for the application and size desired are almost completely interchangeable – differences in electrical components, mounting points, the curvature where the tube and the bezel mate – are all open to change. Alternatively, after a finished product design has been finalized and a specific tube has been chosen, the finished product manufacturer can cut back on production of one design in favor of a different design for the same size product. In this way, the finished good manufacturer can readily substitute between two incompatible CRTs from different manufacturers, simply by having two different designs of, for example, TVs using 21" CPTs from two different tube manufacturers. Exactly that effect is apparent in the tube purchase data provided by LGE. See Exhibit 15.

Prof. Willig implicitly agrees that such substitution can readily occur. He describes Samsung “cheating” on cartel pricing and suggests Samsung's later increase in unit volume shares could be attributable to such cheating.⁴⁹ Gaining share by price discounting only works if finished goods manufacturers can respond to below-cartel pricing by *switching to the “cheating” supplier*

most three families listed, indicating this ordinary-course-of-business cost analysis ignores much of the product differentiation Prof. Willig emphasizes. Samsung SDI, 13 July 2005, Y2005 Status of Units by Model, SDCRT-0201578.

⁴⁷ Willig Report, ¶¶41-42.

⁴⁸ Original Report, pp. 18-20

⁴⁹ Willig Report, ¶88.

Chunghwa explicitly blamed a short-term reduction in its order volume on Samsung undercutting them by \$1 to \$2. Again, this only makes sense if customers were able to reduce production of Chunghwa-based monitors and increase production of Samsung-based monitors. Chunghwa Picture Tubes and LTD, 18 December 1996, Customer Contact Report, Main Content Market Information/Pricing Opinion Discussion, CHU00028773 - CHU00028774 at 8773E.

– that is, only if the finished goods manufacturer can readily substitute at the design-in stage or, post-design-in, by switching production from one finished good model to another.

To the extent consumers view different finished goods of the same size from the same manufacturer as very close substitutes, the finished goods manufacturer can view the different tubes embodied in its finished goods as very close substitutes.

B. Prof. Willig's evidence of different price changes is substantially driven by irrelevant foreign exchange rate changes

Several of Prof. Willig's exhibits purport to show that CRT prices are heterogeneous and volatile. In this section, I show that, due to his inattention to detail, the data he presents in many of his exhibits conflate the effects of changes in exchange rates with changes in CRT prices, and therefore exaggerate the volatility and heterogeneity in CRT prices.

Prof. Willig presents and draws conclusions from analyses that are unreliable; in particular, Prof. Willig's Exhibits 2A, 3A, 9, 16, and 17A are all fatally flawed. Consider his claim, based on Exhibit 2A, that the price changes of CRTs were extremely volatile.⁵⁰ When assessing the validity of this claim, I first turn to my knowledge of the CRT industry and basic economic theory. This case involves a mature industry characterized by highly developed products. Long-term, stable relationships between manufacturers and customers prevail in the industry, in part because finished products are tailored around particular CRT models. Given these relationships, stable prices that are not renegotiated on an order-to-order basis are expected; in such a situation, price changes would have neither a large variance nor a high frequency, contrary to Prof. Willig's analyses.

Documentary and testimonial evidence conforms to these instincts. According to witness testimony, customers and manufacturers maintained long-term relationships.⁵¹ Pricing for CRTs was typically agreed for at least a quarter, and sometimes for a full year.⁵² The terms of these

⁵⁰ Willig Report, ¶46.

⁵¹ See, e.g.,

- “A ... There was a relationship with the customer, and we knew there are longer term needs. As explained, it was not possible for them just to jump from one supplier to the other supplier. So there was a good relationship, a long-term relationship.” 31 July 2012, Deposition of Philips Electronics North America Corporation, Inc. and Koninklijke Philips Electronics N.V. 30(b)(6) Witness Roger De Moor (Hereinafter “Philips 30(b)(6) Roger De Moor Deposition, 31 July 2012”), pp. 146:13 - 147:16.
- “[Sales were] mainly for existing customers.” 17 July 2012, Deposition of Panasonic Corporation, Panasonic North America and MTPD 30(b)(6) Witness Hirokazu Nishiyama, Volume I (Hereinafter “Panasonic 30(b)(6) Hirokazu Nishiyama Volume I Deposition, 17 July 2012”), pp. 65:24 - 66:6.

⁵² See, e.g.,

- “... price was determined, more or less, every three months or on a quarterly basis. Before the one quarter, about one or two months prior to that, the – there was a price negotiation.” Panasonic 30(b)(6) Hirokazu Nishiyama Volume I Deposition, 17 July 2012, pp. 65:24 – 66:6.
- “Q. And were specific prices indicated in those purchase orders, those annual purchase orders? A. Yes. Q. And were those prices in the purchase order fixed for that annual period? A. Technically, yes.” 03 July 2012, Deposition of Hitachi Electronic Devices (USA) 30(b)(6) Witness Thomas Heiser (Hereinafter “Hitachi 30(b)(6) Thomas Heiser Deposition, 03 July 2012”), pp. 131:18 - 132:8.

agreements were then formalized in individual purchase orders.⁵³ Within longer-term price agreements, prices were sometimes renegotiated in response to changing supply conditions or requests from the customer.⁵⁴ The sales process described in the documentary and testimonial record is not conducive to sizeable monthly changes in prices as shown in Prof. Willig's Exhibit 2A.

1. Prof. Willig relies on data that comingle foreign exchange rates and CRT prices

Examination of the data reveals that Prof. Willig has not accounted for the impact of foreign exchange rates on his analyses. Because he has conflated changes in exchange rates with changes in the negotiated price of CRTs, Prof. Willig substantially exaggerates the volatility in CRT prices.

Frequently, and perhaps in the majority of cases, sales were negotiated in a currency other than the U.S. dollar.⁵⁵ As a result, the transaction data that Prof. Willig and I used in our analyses do

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- “So at the time the internal transaction prices for CRT from the CRT business unit to the set business unit were supposed to be adjusted quarterly. Either they were changed or they were extended.” 09 July 2012, Deposition of LG Electronics 30(b)(6) Witness Mok Hyeon Seong (Hereinafter “LG Electronics 30(b)(6) Mok Hyeon Seong Deposition, 09 July 2012”), pp. 77:19 - 78:2.

⁵³ See, e.g.,

- “When the – the agreement was reached about the price, then we would get the purchase order from the customer.” Panasonic 30(b)(6) Hirokazu Nishiyama Volume I Deposition, 17 July 2012, pp. 65:24 - 66:6.
- “You made an agreement with the customer about the pricing of a certain type of CRT and that was the agreement, and that went into the minutes of meetings. So that's not a contract. Then when it came to ordering, you get a specific order from your customer with the price which you had agreed, which you would call legally an order, legally a contract, even.” Philips 30(b)(6) Roger De Moor Deposition, 31 July 2012, pp. 145:10 - 146:12.

⁵⁴ See, e.g.,

- “Q. Okay. So most customers had some kind of annual purchase order with HED/US, is that accurate? A. Yes. Q. And were specific prices indicated in those purchase orders, those annual purchase orders? A. Yes. Q. And were those prices in the purchase order fixed for that annual period? A. Technically, yes. Q. Okay. And what do you mean by “technically, yes”? A. Well, if, for example, in the middle of the year I got a glass price increase, I might try to go back and raise the price to the customer. It doesn't mean I was going to be successful, but I might have had to.” Hitachi 30(b)(6) Thomas Heiser Deposition, 03 July 2012, pp. 131:18 - 132:8.
- “Q. What would lead Philips to renegotiate a price agreed to in a contract, like what if the costs of the production changed? [objection omitted] A. When the customer needed to lower price, they would come to us, because prices were only going down, down, down, down, all the time. And so it could happen that you had a gentleman's agreement. The customer had problems to sell its products, had to go to a lower price point, comes back to PDC and tried to negotiating a lower price. We would say, we have agreed to that, okay, then we were going to lose volume, so that could be a reason to renegotiate.” Philips 30(b)(6) Roger De Moor Deposition, 31 July 2012, pp. 147:17 - 148:10.

⁵⁵ For each transaction in this case, there are three potentially relevant currencies. First, the cartel established target prices in U.S. dollars, as can be seen in the cartel meeting notes. Second, most of the data produced by Defendants was produced at the plant or division level and typically is reported in a single currency for all transactions; call this the currency of record or the accounting currency for the transaction. Finally, there is a currency in which the price was specified when agreed between the buyer and seller; call this the contract currency. In some cases, for example,

not simply list a U.S. dollar price for every transaction. Revenues and prices were recorded in a local currency which varied across manufacturer, subsidiary, time, and transaction. The records on some transactions report a U.S. dollar price, either because this is the designated local currency or because prices have been computed in multiple currencies. When the record does not include a U.S. dollar price, I computed U.S. dollar prices from the local price using the exchange rate from the date of the transaction.

As such, any change in the U.S. dollar price of a product over time reflects a change in the negotiated price, a fluctuation in the exchange rate, or both. Since exchange rates varied on a daily basis for most of the currencies in question during the class period, at times quite volatily, noise in U.S. dollar prices due to exchange rate variation is significant and pervasive.

A simple example will demonstrate why this presents a problem for Prof. Willig's analyses. In Exhibit 16, I have reproduced Exhibit 1A from Prof. Willig's report, which plots the prices for CRT transactions over time in U.S. dollars, and I have highlighted prices for two CRT products: a 21" ITC CDT and a 29" bare CPT. As shown in Exhibit 17, both are characterized by the sort of volatility emphasized by Prof. Willig's Exhibit 2A; for the specific 29" bare CPT, indicated with blue squares, price changes range between plus and minus 5%, and for the 21" ITC CDT, indicated with red triangles, price changes range from over negative 5% to about positive 3%. I calculated the price of each of these products in Japanese yen, the local currency reported in the data's source, and plotted the resulting series in Exhibit 18. Once converted to yen, the price for each product becomes *completely* stable over time. For these two products, Prof. Willig has generated volatility in negotiated prices where *none* existed.

The data on Panasonic's transactions prior to 2001 provide a useful case study to demonstrate that I have not simply identified two problematic, but isolated examples. Panasonic's data for this period are recorded entirely in Japanese yen, and contracts seem to have been negotiated in this currency.⁵⁶ At the level of manufacturer, customer, and model, the same level at which Prof. Willig does his analysis, yen transactions prices are unchanged for 1,742 of the 2,260 total observations in the data set.⁵⁷ That is, for about 77% of the observations in these data, there was no change in the yen price whatsoever. For the period after April 2001, after the merger with Toshiba, the Panasonic (MTPD) data appear to use multiple foreign currencies. However, even in this messier data, local currency transaction prices were unchanged for 5,235 of the 11,645 total observations.⁵⁸ I calculated the monthly change in U.S. dollar prices for all Panasonic data

the data produced by HEDUS, all three currencies were the same. In other cases, for example Samsung's Malaysian plant, the accounting currency is the Malaysian Ringgit for all transactions and the contract currency is \$U.S. for most transactions (although at least one customer had a Yen-denominated contract). 17 January 2013, Deposition of Dae Eui Lee, Volume II, p. 313 - 317.

⁵⁶ The Panasonic data include three variables for the total amount of each transaction: local currency, Yen, and \$U.S. The data also include an exchange rate used to convert local currency amount to Japanese Yen. For the period prior to April 1, 2001, this exchange rate is always one (1.0). Additionally, when the local currency price is calculated, by dividing the amount of the transaction by the quantity, and then compared month-to-month for a given customer and product, 77% of the observations show no month-to-month change whatsoever.

⁵⁷ I use the percent of observations here, rather than percent of unit volume, because I am assessing the degree to which individual points in Prof. Willig's Exhibit 2A might be showing month-to-month price changes that are actually purely exchange rate fluctuations.

⁵⁸ A substantial number of the non-zero changes are quite small and frequent for a given product, in contrast to the relatively infrequent and somewhat larger changes observed in the Yen prices during the earlier period. These might

observations that have no change in local currency prices and plotted the resulting data in Exhibit 19. As none of the transactions underlying Exhibit 19 actually experienced any change in price when expressed in local currency, the changes in the U.S. dollar are, without exception, the product of exchange rate fluctuations. In the early period, when the only local currency is yen, there is a single exchange rate (\$U.S. to Yen) inducing false variation. After April 2001, with multiple local currencies involved, I plot the maximum and minimum false variation to show the range of possible false variation in Prof. Willig's Exhibit 2A. The range of possible false variation often extends from well below zero (false price declines) to well above zero (false price increases) in the same month. That indicates one currency fell against the dollar and while another currency rose. More importantly, it shows that both the sign and the magnitude of the false variation depend on controlling for the currency of the transaction when one examines changes in prices. As in Prof. Willig's Exhibit 2A, currency conversion has created a false impression of volatility in prices.

2. Comingling foreign exchange rate and CRT price data makes it less likely to find commonality

Before I conducted the analyses underlying my initial report, I carefully considered the impact that exchange rates would have on my ability to draw conclusions about the CRT industry and alleged cartel. After weighing several options, I decided to conduct my analyses using prices in U.S. dollars. This decision was based on a number of factors, including the following two. First, examining prices in a common currency allowed me to make direct comparisons between prices, greatly simplifying the execution and interpretation of my analyses. Second, the effect of exchange rate volatility on analyses conducted using prices in U.S. dollars is easily interpreted. In my hedonic analyses, for example, exchange rate noise accounts for a share of the unexplained variation in the model. In my price matching analyses, on the other hand, it increases the variance of the distribution of the ratio of actual to target prices around the mean. Both of these effects are conservative to my analysis. That is, this noise increases the likelihood that I will find that individual factors outweigh the influence of common factors.

Prof. Willig has given no indication that he has considered the impact of exchange rates on his analysis. At the time of his deposition, Prof. Willig was unsure whether prices in Defendants' sales data were quoted in U.S. dollars or a different currency and regarded the issue as irrelevant.⁵⁹ When asked whether "it is possible that the changes [in dollar prices] from month to month could just reflect changes in the currency conversion rate," Prof. Willig admitted that "[if] the data looked like that, that's a conceivable possibility."⁶⁰

3. Prof. Willig's transformations of the data result in unreliable measures of the relevant CRT prices

Many of Prof. Willig's conclusions do not stand up to close inspection. He often makes use of data which have been transformed from levels in one currency to levels in U.S. dollars to

be due to exchange rate volatility as well, possibly things like a \$U.S. price being paid in a given currency on one day and being credited at a slightly different exchange rate on a slightly later day.

⁵⁹ Willig Dep., p. 89.

⁶⁰ Willig Dep., pp. 90-91.

percentage changes in U.S. dollars. Because exchange rates changed frequently and in significant increments over the class period, the percentage change in U.S. dollar prices is an unreliable indicator of the change in negotiated CRT prices. At the very least, ignoring exchange rate changes contributes unaccounted noise to Prof. Willig's analyses. When he considers the sign of changes exclusively, it renders them completely meaningless.

This is most easily seen in Prof. Willig's Exhibit 9. In this exhibit, Prof. Willig divides the transaction data between CPTs initially sold to customers in North America and those initially sold to customers elsewhere. For each region, Prof. Willig computes a price index in order to capture the movement of average CPT prices in each region over time and identifies the months in which the index changed substantially. He then examines the change in \$U.S. prices in these months for transactions in the other geographic region and determines the fraction of the quantity involved in those transactions that changed in the same direction as the original \$U.S. price change. Over the course of the class period, about half of the \$U.S. prices for North American transactions move in the same direction of the foreign \$U.S. price index and about half move in the opposite direction. Based on these figures, Prof. Willig concludes that the \$U.S. prices of CRTs in different regions exhibited substantially different patterns of changes because they were affected by different economic forces.⁶¹ As I will show, Prof. Willig's conclusion was based on a misinterpretation of the data which did not account for exchange rate noise.

In this analysis, as in all others examining changes in CRT prices,⁶² Prof. Willig calculates monthly changes in the price indices and transaction prices using U.S. dollar prices. Prof. Willig failed to identify whether changes in the foreign price index were caused by changes in negotiated CRT prices or exchange rates. Prof. Willig similarly failed to identify the source of changes in the foreign CRT transaction prices which he compares to the North American price index. As I described above, the noise introduced by exchange rate fluctuations varies significantly in both sign and magnitude depending on the local currency. This means the changes on which Prof. Willig bases his conclusions are unreliably measured. When examined in light of exchange rate issues, it becomes clear that Prof. Willig's results have no bearing on the question of whether North American and foreign CRT transactions were affected by similar economic forces.

A simple inspection of the data underlying Prof. Willig's analysis conveys this fact. I took a close look at three of the months identified by Prof. Willig in which the foreign price index changed substantially: January 1998, the month with the smallest absolute change in the foreign price index among the months Prof. Willig chose; December 1998, the month with the largest change; and December 2000, the month with the median absolute change. In December 1998, the price index increased by 6.7%. Of the 33 products underlying this calculation, 32 experienced *no* change in the yen price, and the remaining product experienced a yen price *decrease*. In January 1998, the price index increased by 2.0%. Of the 41 products underlying this calculation, 39 experienced *no* change in the yen price and the remaining two products experienced a price *decrease*. Finally, in December 2000, the price index decreased by 3.2%. Of the 33 products underlying this calculation, 31 experienced *no* change in the yen price and the remaining two products did experience a price decrease. These results, presented in Exhibits 20 through 22,

⁶¹ Willig Report, ¶18 and Exhibit 9.

⁶² Specifically, Willig Report Exhibits 2A, 3A, 9, 16, and 17.

show that the change in the foreign price index for these three months was almost entirely the product of movements in the yen-to-dollar exchange rate.

In Exhibit 3A, Prof. Willig conducts a similar analysis, but divides the data between different product characteristics rather than region. By showing that patterns in price changes were heterogeneous across CRTs with different characteristics, Prof. Willig attempts to argue that different types of CRTs were affected by different economic forces.⁶³ The same criticism applies to Prof. Willig's Exhibit 3A as to his Exhibit 9. The changes in the price indices and transaction prices used in this exhibit are measured using U.S. dollar prices. As such, exchange rate fluctuations predominate in determining the sign and magnitude of these changes. The analysis in his Exhibit 3 is little more than an irrelevant comparison of movements in exchange rates.

Next consider Prof. Willig's Exhibit 17A, in which he matches his calculated changes in target prices and changes in actual prices and plots the resulting pairs. Upon visual inspection, there appears to be little systematic relationship between the changes in actual and target prices. However, as in Exhibits 2A, 3A, and 9, Prof. Willig has incorrectly generated the sign and magnitude of the change in actual prices due to exchange rate issues (he also misidentifies changes in target prices, as I will demonstrate later). Prof. Willig's Exhibit 16, a formalization of Exhibit 17A, suffers from the same flaw. Prof. Willig has attempted to find a relationship between two variables which are unreliably measured. That he did not find a relationship is not surprising; the apparent lack of relationship is driven by unreliable data.

4. The oversights and methodological flaws underlying Prof. Willig's Exhibits 2A, 3A, 9, 16, and 17A are repeated throughout his rebuttal report

I have provided this extended example to demonstrate how one simple oversight calls into questions the validity of at least five exhibits from Prof. Willig's report. Throughout this rebuttal, I will demonstrate that similar oversights and methodological flaws are recurrent in Prof. Willig's report. Prof. Willig has based his conclusions on flawed analyses; they are therefore untenable.

VII. The cartel had a common impact on direct purchasers in the form of higher prices

A. Overview

1. Summary of my findings

Having reviewed Prof. Willig's analyses, I find that my conclusions are unchanged. Applying standard economic principles to the facts of the case lead to the conclusion that the cartel had market power to increase prices above the competitive level. The cartel engaged in conduct that has been used by successful cartels. An examination of the documentary evidence and a statistical analysis of cartel target prices relative to actual prices further supports my conclusion of a successful cartel. Prof. Willig has little to say on these matters, beyond suggesting that two industry characteristics – vertical integration and changes in market shares – are inconsistent with a successful cartel. In fact, these two industry characteristics are equally consistent with the

⁶³ Willig Report, ¶49.

existence of a successful cartel, as I explain in Sections VII.B.2 and VII.B.3, and hence are uninformative.

To determine whether the cartel's impact was common across direct purchasers, I examined whether a price structure existed. Price structure is simply a shorthand way of referring to price patterns between related products.⁶⁴ For the impact of a cartel to be common – that is, to have raised price above the but-for competitive price for all direct purchasers – is in no way related to changes in the price structure over time. The relationship between prices at a point in time is dependent on the market forces prevailing at that time. As those market forces change over time (e.g., as larger CRTs became available), so do the actual and but-for prices. The impact remains common so long as the entire price structure at that point in time is higher than it would have been in a competitive world, at that same point in time.

2. Summary of Prof. Willig's criticisms

Prof. Willig and Defendants' counsel claim that I have failed to demonstrate common impact on direct purchasers. They point to industry features such as vertical integration and (supposedly) opaque pricing, as well as evidence of shifting market shares and cartel cheating, to counter my evidence of successful collusion.⁶⁵ They take issue with the methodology I used to compare actual sales prices to target prices and the fact that I did not calculate but-for prices to determine overcharges.⁶⁶ They reject the notion and existence of an underlying price structure in the CRT industry, claiming that heterogeneous products with heterogeneous price movements preclude such a structure, making it impossible for the cartel to affect the prices of all CRT products while setting target prices for only some.⁶⁷ Finally, Prof. Willig and Defendants counsel attempt to show that a distinct market for CRTs existed in North America, placing direct purchasers in the U.S. outside the immediate influence of the cartel.⁶⁸

B. Economic theory as applied to the facts of the case is consistent with the cartel's success in increasing prices

1. The cartel had market power

The CRT cartel possessed significant market power, and was thereby able to set prices above the competitive level. It supplied a dominant share of CRTs, about 90% throughout the class period,⁶⁹ and controlled a similar share of CRT productive capacity.⁷⁰ Prof. Willig does not dispute the CRT cartel's dominance of the industry. There were few competitively-supplied

⁶⁴ Section VII.E.1.a).

⁶⁵ Willig Report, ¶¶81-89 and Memo in Opp., pp. 9-10.

⁶⁶ Willig Report, ¶¶103-114 and Memo in Opp., pp. 28-33.

⁶⁷ Willig Report, ¶¶38-79 and Memo in Opp., pp. 33-36.

⁶⁸ Willig Report, ¶¶64-68 and Memo in Opp., pp. 31-32.

⁶⁹ The CRT cartel supplied about 90% of CRTs throughout the class period, more than 95% of CDTs for much of the class period, and its share of CPTs was at least 85% throughout the class period. Original Report Exhibits 1, 5, and 6.

⁷⁰ Original Report Exhibit 12.

alternatives to cartel-supplied CRTs; perhaps the best alternative to CRTs, LCD panels, were supplied by an illegal cartel, some of whose members were also members of the CRT cartel.⁷¹ Competition from entrants in the manufacture of CRTs presented no significant challenge to the power of the CRT cartel to impose overcharges on direct purchasers, because chronic excess capacity throughout the class period and the large investment necessary to enter made entry unattractive.⁷² In fact, there was no meaningful entry in the CRT industry during the class period.⁷³ Prof. Willig does not dispute that there was no meaningful entry in the CRT industry, and acknowledges the presence of high entry barriers.⁷⁴

Prof. Willig does not offer any rebuttal to the evidence showing that the cartel colluded to reduce capacity and restrict output. However, Prof. Willig asserts that cheating would have impaired the cartel's ability to effectively raise prices (I respond to this claim in Section VII.C).⁷⁵ In my original report, I cited many examples of cartel members agreeing to temporary line shutdowns and permanent capacity reductions.⁷⁶ I also provided instances of Defendants monitoring these agreements through factory visits.⁷⁷ Prof. Willig acknowledges that it is an economic fact that changes in output lead to changes in price.⁷⁸ The cartel meeting notes show the cartel was fully aware of this relationship, with cartel members proclaiming they had successfully increased prices of both CDTs and CPTs by reducing capacity and cutting production. For example, on the CDT side, notes from a October 13, 1999 meeting read: "In order to contribute to the stabilizing of the market price, CPT has decreased production of 17" to the utmost degree for quite a long time...Mr. Lin emphasized that this year the 17" price has been able to be keep [sic] at a price no less than \$90 because of the Glass Meeting."⁷⁹ On the CPT side, notes from an October 27, 1999

⁷¹ Original Report, Section VIII.A.1.b).(2).

⁷² Original Report, Section VIII.A.1.c).

⁷³ The only significant entrant, Videocon, acquired the productive capacity of a cartel member that exited the industry, and joined the cartel itself, so was unlikely to have had any significant effect on price, because it did not raise industry capacity, and did not affect the cartel's share of the industry's capacity. Original Report, Section VIII.A.1.c).1.

⁷⁴ Willig Report, ¶87.

⁷⁵ Willig Report, ¶88.

⁷⁶ Original Report, footnotes 176 and 177.

⁷⁷ Original Report, footnotes 178, 179, and 180.

⁷⁸ Willig Dep., p. 63:16 - 23.

⁷⁹ Hsieh, Chun-Mei (Christina), 13 October 1999, Contact Report, Meeting Topic: CDT Regular Exchange Meeting, CHU00030888 - CHU00030893 at 0888.02E-0889.01E. For context, see,

- Notes from a 3/8/99 meeting: "Excess supply of 17"/19" CDT's and imbalance of models are worsening...In order to at least maintain the current price level or increase the price level, it is necessary to reduce production by at least 10% when taking the margin of 10% into consideration." Samsung SDI, 08 March 1999, CDT Industry (March of '99) Meeting Results, SDCRT-0086563 - SDCRT-0086566 at 6565E.
- Notes from a 4/14/99 meeting: "The price of the 17" CDT which was increased per agreement starting in May will be raised again (around July) after observing the situation...The companies agreed to stop producing 17" CDT's for at least 5 days (25 days of operation)...In the event that there are any changes to the line operation plans, such changes should be reported to other companies by fax or other means in

meeting read: "Price-up trend [of small and medium CPTs] in European & American market thanks to capacity reduction in Asia."⁸⁰ Notably, the sales data produced by the Defendants support their claims in both instances: actual prices follow the target prices set by the cartel. This is shown in Exhibit 23 (17" CDTs), Exhibit 24 (14" [small] CPT), and Exhibit 25 (20" [medium] CPT).

advance." Samsung SDI, 19 April 1999, Report on the April 14 Management Meeting Results, SDCRT-0086593 - SDCRT-0086596 at 6593E.

- Notes from a 5/21/99 meeting: "[Bullet] Up to now, the capacity adjustment for 17" CDT's has been proceeding smoothly as a result of cooperation among the companies. [Bullet] In June, 17" CDT production will stop for 5 days (25 operating days) to adjust the actual production volume in order to maintain the price level." Samsung SDI, May 1999, Report on the CDT management meeting results (May of '99), SDCRT-0086632 - SDCRT-0086633 at 6632E.
- Notes from a 6/23/99 meeting: "[Heading] 17" Production Control [text] a) Mr. Jerry commented that various makers have coordinated very well on 17" Capacity control in the past three months. In view of the market situation, July's number of non-workdays should be higher than the average number over the April-June period, to demonstrate each maker's commitment to safeguarding the price." Chunghwa Picture Tubes and LTD, 23 June 1999, Business Meeting Report, CHU00030787 - CHU00030794 at 0791.02E.
- Notes from a 7/23/99 meeting, "Senior Manager Cheng proposed that the production stoppage period for 17" tubes be at least seven days in August in order to effectively ensure price levels. . . Ultimately, a resolution was reached by everyone that a minimum of seven days stoppage will be implemented in August." Chunghwa Picture Tubes and LTD, 23 July 1999, Visitation Report, Topic: CDT Market Information Exchange and Price/Production Volume Review, CHU00030809 - CHU00030814 at 0810.01E - 0810.02E.
- Notes from an 8/20/99 meeting, "Meeting attendees agreed that, in order to effectively ensure price level, 17" tube production shutdown period needs to be at least 5 days in September. Each maker will provide a production stoppage plan before 8/24, and complete Audit plans for related factory zone before 8/28." Chunghwa Picture Tubes and LTD, 20 August 1999, Visitation Report, CHU00030835 - CHU00030838 at 0837E.

⁸⁰ Chunghwa Picture Tubes and LTD, 27 October 1999, Visitation Report, Topic: Exchange of Market Information and Price Review, CHU00030899 - CHU00030903 at 0902E. For context, see:

- Notes from a 9/26/98 meeting, "In order to stabilize price for this over-supplied market, a simulated adjustment of each maker's Q4 [1998] production volume plan is as follows." The notes then detail the quantity reductions of 14" and 20"/21" CPTs for each maker. Chunghwa Picture Tubes and LTD, 26 September 1998, Visitation Report, Topic: 14"/20"/21" CPT Supply/Demand and Price Comment Review, CHU00029262 - CHU00029264 at 9264.01E.
- Notes from a 11/27/98 meeting, "In an overall view of Q1 [1999], all makers are taking action to reduce production according to order status so no further discussion was conducted on this topic." The targeted products are 14", 20", and 21" CPTs. Chunghwa Picture Tubes and LTD, 27 November 1998, Visitation Report (Submit), CHU00029259 - CHU00029261 at 9261.01E.
- Notes from a 5/20/99 meeting describe the number of production lines reduced by each maker for 14" and medium-sized CPTs in Q1 1999. Supply and demand forecasts show overcapacity declining as the year progresses. Chunghwa Picture Tubes and LTD, 20 May 1999, Meeting Minutes, Meeting Subject: CPT Top Management Meeting, CHU00029191 - CHU00029194 at 9193E.
- Notes from a 1/24/00 meeting indicate that 14" CPT capacity was reduced 5.1% in 1999, and 20"/21" CPT capacity was reduced 9.8% in 1999. Chunghwa Picture Tubes and LTD, 24 January 2000, Visitation Report, CHU00029152 - CHU00029154 at 9153E.

2. Vertical integration is consistent with a successful cartel

a) The net effect of facilitating factors is ambiguous

Economists have identified – theoretically and empirically – a number of industry characteristics which may facilitate or hinder the ability of firms to successfully collude to raise prices. For example, it may be easier for firms to collude if they interact in multiple markets, or it may be more difficult to collude if the number of firms is large and each has a relatively small market share.

Analysis of such industry characteristics may be useful when assessing the relative likelihood of collusion in a large cross-section of industries. However, they are of limited use in determining whether collusion has actually occurred in a particular industry, or whether a cartel has successfully raised prices above the competitive level.

Both cartelized and competitive industries are likely to exhibit one or more characteristics that facilitate collusion and one or more characteristics that hinder collusion. Economic theory has very little to say about the relative magnitude of each effect. Furthermore, some industry characteristics, such as the presence of vertical integration, may facilitate collusion in one theoretical model, but hinder collusion in another model.

Accordingly, the net effect of one or more industry characteristics on the ability of firms to collude is ambiguous, and whether or not a cartel can successfully raise prices in a specific industry is an empirical question. For these reasons, the success of the CRT cartel is an empirical question and cannot be determined solely by economic theory.⁸¹

b) Vertical integration and cartel cheating

Vertical integration refers to a situation where a firm that operates at one stage in the distribution channel (e.g., CRT manufacturers) also operate at another stage in the distribution channel (e.g., manufacturers of CRT monitors and/or TVs). As documented in my original report, many of the CRT manufacturers are vertically integrated into manufacturing of CRT monitors and TVs.⁸²

(1) Prof. Willig presents only one side of the story when describing the effects of vertical integration on the likelihood of cartel success

Prof. Willig claims that economic theory predicts successful collusion is less likely in an industry with firms exhibiting differing degrees of vertical integration, such as the CRT industry, because it could make monitoring the cartel agreement more difficult, increasing the incentive to cheat.⁸³ As his only support, he cites an undergraduate text for the proposition that if some firms are vertically integrated “it may be difficult for the cartel to determine at what point in the distribution chain cheating occurs.”⁸⁴

⁸¹ Willig Report, p. 38.

⁸² Original Report, Section VI.C.3.

⁸³ Willig Report, pp. 35-38.

⁸⁴ Carlton, Dennis W. and Jeffrey M. Perloff, 2005, Modern Industrial Organization, Fourth Edition, Person Addison Wesley, p. 139.

Prof. Willig also argues that a vertically integrated firm will have different incentives than a non-integrated firm, and that this will reduce the likelihood that cheating will be detected.^{85,86} He claims that a vertically integrated cartel member would be less likely to be caught cheating on the price fixing agreement because when it sells to its downstream affiliate at a price below the cartel agreement, the downstream affiliate is less likely to report cheating to other cartel members than an unaffiliated customer would be. This is essentially the same argument as above, that differing degrees of vertical integration among cartel members can make monitoring the cartel agreement more difficult, which could make the cartel less effective at raising prices above the competitive level.

(2) Many vertically integrated firms have been part of successful cartels.

Prof. Willig ignores the fact that many successful cartels have featured members with differing degrees of vertical integration. One paper notes that “many famous cases of collusion have involved intermediate goods industries. Further, a significant fraction of those cases involved industries where one or more firms were vertically integrated.”⁸⁷ Examples of successful cartels in which at least one firm was vertically integrated include an early 20th century German steel cartel, the bromine cartel, railways, timber-cutting, and joint bidding for oil and gas tracts.⁸⁸

The LCD cartel was comprised of many of the same firms, both vertically integrated (LG, Samsung, Sharp, and Toshiba) and unintegrated (Chunghwa) as the CRT cartel. The varying levels of vertical integration did not prevent them from successfully raising prices and, as found by the jury in the AUO trial, causing at least \$500 million in overcharges.⁸⁹

(3) Vertical integration can facilitate collusion

One reason why many successful cartels feature one or more vertically integrated firms could be that vertical integration can facilitate collusion, leading to a more successful and stable cartel than in an industry with unintegrated firms. A survey of the competitive effects of vertical integration concludes that, “generally, successful express or tacit collusion requires reaching an

⁸⁵ “In particular, whereas unaffiliated finished-product manufacturers could be expected to use favorable pricing offered by one CRT manufacturer to try to convince other CRT manufacturers to offer even lower prices, an integrated finished-product manufacturer would not reveal that its upstream affiliate had cheated on the cartel agreement by lowering its transfer price.” Willig Report, footnote 83.

⁸⁶ In my original report, I explained how both vertically integrated and non-integrated cartel members benefit from raising prices above the competitive level. See Original Report, Section V.B.3.

⁸⁷ Nocke, Volker, and Lucy White, September 2007, Do Vertical Mergers Facilitate Upstream Collusion?, American Economic Review, Vol. 97, No.4, 1321-1339, p. 1321.

⁸⁸ Nocke, Volker, and Lucy White, September 2007, Do Vertical Mergers Facilitate Upstream Collusion?, American Economic Review, Vol. 97, No.4, 1321-1339, p. 1321.

⁸⁹ United States Department of Justice, 13 March 2012, Taiwan-Based AU Optronics Corporation, Its Houston-Based Subsidiary and Former Top Executives Convicted for Role in LCD Price-Fixing Conspiracy, http://www.justice.gov/atr/public/press_releases/2012/281032.htm, accessed 20 September 2012.

agreement, monitoring compliance, and punishing defections. Vertical integration might facilitate collusion by aiding any of these activities.”⁹⁰

Nocke and White (2007) show that vertical integration can affect the incentive to cheat on a collusive agreement in the upstream industry in at least two ways.⁹¹ First, vertical integration reduces non-integrated firms’ incentive to cheat because they cannot profitably sell to the downstream affiliate of a vertically integrated cartel member. This effect is called the “outlets effect” because it reduces the number of outlets through which a cheating firm can sell, reducing the ability to cheat and thus facilitating collusion. On the other hand, it may be more difficult to punish a vertically integrated firm for cheating on the collusive agreement.⁹² This “punishment effect” tends to make collusion more difficult to sustain. The authors demonstrate that under very general assumptions the outlets effect dominates the punishment effect. That is, some degree of vertical integration tends to make collusion easier.⁹³

The 1984 Merger Guidelines described at least two other ways in which vertical integration could facilitate collusion.⁹⁴ First, vertical integration could create a barrier to entry by forcing potential entrants in one market to enter both the upstream and downstream markets. Second, vertical integration may make it easier for cartel members to monitor prices if the price of the downstream product is more visible than price of the upstream product, as is the case in the CRT industry.⁹⁵

(4) Prof. Willig’s argument that vertically integrated firms are more likely to cheat on the cartel agreement is inconsistent with standard economic theory

Prof. Willig does not explain how a vertically integrated firm could “cheat” on the cartel agreement when transferring an intermediate good (such as a CRT) to an affiliated finished goods manufacturer. In such a transaction, there is no economically meaningful sale at a market price. Instead, the upstream affiliate charges a “transfer price” to the downstream affiliate, which, regardless of its size, has no effect whatsoever on the profit of the vertically integrated organization. The vertically integrated firm has no incentive to “cheat” on the cartel agreement by setting a low transfer price because the process is analogous to an individual moving money

⁹⁰ Riordan, Michael H., 2008, Competitive Effects of Vertical Integration, in Buccirosi, Paolo (Eds.), Handbook of Antitrust Economics, MIT Press: Massachusetts, 145-182.

⁹¹ Nocke, Volker, and Lucy White, September 2007, Do Vertical Mergers Facilitate Upstream Collusion?, American Economic Review, Vol. 97, No.4, 1321-1339 and Original Report, pp. 12-14.

⁹² Specifically, the downstream affiliate of the vertically integrated firm may make positive profits during the punishment phase, which softens the impact of the cartel’s punishment strategy.

⁹³ In a similar paper, Norman (2009) also finds that vertical integration facilitates collusion. Normann, Hans-Theo, 2009, Vertical Integration, Raising Rivals’ Costs and Upstream Collusion, European Economic Review, Vol. 53, 461-480.

⁹⁴ The 1984 Merger Guidelines included a section on the horizontal (i.e., competitive) effects of non-horizontal mergers. A sub-section described how vertical mergers can facilitate collusion. My understanding is that the non-horizontal merger guidelines are still in effect. U.S. Department of Justice and Federal Trade Commission, 1984, 1984 Merger Guidelines, Section 4.22.

⁹⁵ This is exactly the opposite of the conclusion drawn by Prof. Willig.

from one pocket to another pocket.⁹⁶ Similarly, other cartel members have no incentive to monitor the internal transfer prices of a vertically integrated firm.

There is some evidence, however, that some cartel members were concerned with the internal transfer prices of vertically-integrated cartel members and monitored transfer prices and objected in cartel meetings when they were deemed too low.^{97,98} This ability to monitor fellow cartel members' transfer prices indicates that vertical integration did not eliminate the ability of the cartel to monitor pricing of vertically integrated firms.

(5) The CRT cartel developed sophisticated strategies for sharing information and developing trust

Because limits to the ability to monitor other cartel members can make enforcement of a cartel agreement difficult, cartels often develop sophisticated organizational structures and institutions to share information and develop trust among members.⁹⁹ These strategies are intended to discourage cheating and enhance detection, particularly when prices are otherwise difficult to observe.

⁹⁶ The transfer price could matter for tax purposes if, for example, the upstream and downstream affiliates are located in different tax jurisdictions. For this reason there is broad consensus among national tax authorities for the use of the arm's length principle when determining transfer prices between related entities. Loosely stated, the arm's length principle requires related firms to treat each other as separate entities for the purpose of transfer price accounting. See Organisation for Economic Co-Operation and Development, 22 July 2010, Review of Comparability and of Profit Methods: Revision of Chapters I-III of The Transfer Pricing Guidelines.

⁹⁷ See, e.g.,

- "At the meeting, questions will be raised regarding SDI/LPD's failure to raise price with intra-group customers, which caused the baseline price of the top six makers not being on the same base standard." Chunghwa Picture Tubes and LTD, August 2004, CPT Overseas Trip Application, CHU00031268 - CHU00031269 at 269E.
- "LPD: Challenged that SDI did not keep the price increase with Delta, Compal, AOC, and SEC by mentioning specific prices." Samsung SDI, 06 May 2004, Below are the results of the meeting of the 3 companies, SDCRT-0090299 - SDCRT-0090301 at 0300.01E.

⁹⁸ The standard economic theory of vertical integration assumes that the upstream and downstream affiliates behave as if they are managed as a single profit-maximizing entity. To such a perfectly-integrated entity, transfer prices are irrelevant. In reality vertically integrated subsidiary firms may have some degree of independence such that managers care about the profit their units make, rather than caring only about the vertically-integrated parent firm's total profits. To the extent that this is the case, cartel members may have an interest in the level of transfer prices.

⁹⁹ "Successful cartels overcome this fragility through the development of sophisticated and flexible organizations. Cartels must identify a collusive equilibrium, coordinate on it, and then continuously update as demand and costs fluctuate. Cartels develop these organizations over time as a result of organizational learning. When cartels 'learn,' what are they learning? They learn how to monitor output and prices of individual cartel members in order to detect cheating. They learn how to structure incentives so that collusion is more profitable in the long run than cheating. Successful cartels fashion self-imposed penalties or other compensation schemes for firms that exceed cartel quotas. They learn how to structure cartel-imposed punishments and other disciplinary actions in response to cartel violations. They develop and implement exclusionary practices to prevent entry or expansion by nonmembers. Finally, they develop an elaborate internal hierarchy that allows communication on various levels (executive and middle-management) not only to provide flexibility in the details of the agreement, but to build trust as well." Levenstein, Margaret C., and Valerie Y. Suslow, 2006, What Determines Cartel Success?, *Journal of Economic Literature*, Vol. XLIV, 43-95, p. 67.

The CRT cartel developed sophisticated mechanisms and institutions for sharing information and developing trust. The CRT cartel established a hierarchy of meetings, with high level executives meeting a few times each year to set cartel prices and policies and lower level employees meeting more frequently to implement and monitor the agreement.¹⁰⁰ Executives sometimes met at golf courses (greens meetings), with the meetings also functioning as social occasions intended to “strengthen mutual trust.”¹⁰¹ Cartel members also shared information regarding negotiations with customers including product specifications, prices, and quantities.¹⁰² To enforce the agreement, the cartel sent “auditors” to verify production line shutdowns and cross-checked price and sales data exchanged between members with information received from customers.¹⁰³

3. Changing market shares are consistent with an effective cartel

Prof. Willig claims that shifting market shares in the CRT industry is a sign that the cartel was either unstable or ineffective.¹⁰⁴ He is wrong.

a) Shifting market shares are consistent with successful and stable collusion

Contrary to Prof. Willig’s claims, economic theory indicates that shifting market shares are perfectly consistent with an effective and stable cartel. In fact, the two papers that Prof. Willig cites do not actually support his claim that shifting market shares indicate that a cartel is unstable or ineffective.¹⁰⁵

Both papers focus on the identification of characteristics common to industries known to have been cartelized. They both suggest that antitrust authorities could use analysis of market shares over time as a screening tool to determine whether further investigation into collusion is warranted. One author cautions that “At best, collusive markers [such as market shares over time] can serve to screen industries to determine whether they are worthy of more intense

¹⁰⁰ Original Report, Section VIII.A.2.a.

¹⁰¹ “[I]n order to make friendly contacts and strengthen mutual trust, the makers agreed that every 3-4 weeks they would take turns to host a Green Meeting (only two members from each maker) after the meeting is over.” Chunghwa Picture Tubes and LTD, 09 November 1999, Visitation Report, CHU00030916 - CHU00030918 at 0916.02E.

¹⁰² Original Report, Section VIII.A.2.b.

¹⁰³ Original Report, Section VIII.A.2.f.

¹⁰⁴ Willig Report, footnote 87, citing to

- Grout, Paul A. and Silvia Sonderegger, 2005, Predicting Cartels, Office of Fair Trading.
- Harrington, Jr., Joseph E., 2008, Detecting Cartels, in Buccirosi, Paolo (Eds.), Handbook of Antitrust Economics, MIT Press: Massachusetts, 213-258.

¹⁰⁵ “Economists have recognized that shifting shares among alleged cartel members is a symptom of an unstable cartel.” Willig Report, footnote 87, citing to

- Grout, Paul A. and Silvia Sonderegger, 2005, Predicting Cartels, Office of Fair Trading.
- Harrington, Jr., Joseph E., 2008, Detecting Cartels, in Buccirosi, Paolo (Eds.), Handbook of Antitrust Economics, MIT Press: Massachusetts, 213-258.

investigation.”¹⁰⁶ Neither paper states that cartels with shifting market shares are ineffective at raising prices or otherwise unstable.

One of the papers cited by Prof. Willig explains that market shares can be *less* stable under collusion than under competition, depending on the models of collusion and competition.¹⁰⁷ In these models, “the best collusive equilibrium may have market shares moving over time as firms achieve a more efficient mechanism in which a firm with lower cost has a higher market share. ... Thus, market shares are predicted to change over time (with firms’ costs) and furthermore, a firm’s market share is negatively correlated over time.”¹⁰⁸ Prof. Willig does not develop a model of competition or collusion that is applicable to the CRT industry, so it is impossible for him to conclude that shifting market shares are more consistent with collusion or competition.

The other paper cited by Prof. Willig describes an empirical study of industry characteristics associated with cartel formation.¹⁰⁹ The authors find that market share volatility is *not* a statistically significant predictor of cartelization in an industry.¹¹⁰

Prof. Willig again only presents the side of economic theory that supports his conclusion and fails to acknowledge that his story is incomplete. There is a multiplicity of economic models of collusion, and even for a single model of collusion, there are often a number of potential collusive equilibria. Many collusive equilibria are perfectly consistent with fluctuating market shares, while others may depend, at least in part, on cartel members maintaining relatively stable market shares.¹¹¹ That is, firms can collude successfully in a number of ways. Some of these methods of collusion may involve stable market shares, while others may not. Shifting market shares are not necessarily a sign that a cartel has failed to consistently raise prices above the competitive level.

b) Successful cartels may have significant changes in market shares

The market shares of members of successful cartels often vary over time. For example, three recent, high profile cartels – the citric acid, graphite electrodes, and vitamins cartels – exhibited

¹⁰⁶ Harrington, Jr., Joseph E., 2008, Detecting Cartels, in Buccirossi, Paolo (Eds.), Handbook of Antitrust Economics, MIT Press: Massachusetts, 213-258, pp. 236-237.

¹⁰⁷ Harrington, Jr., Joseph E., 2008, Detecting Cartels, in Buccirossi, Paolo (Eds.), Handbook of Antitrust Economics, MIT Press: Massachusetts, 213-258, pp. 244-246. Athey, Susan and Kyle Bagwell, 2001, Optimal Collusion with Private Information, The RAND Journal of Economics, Vol. 32(3), 428-465, which is the source of the underlying model.

¹⁰⁸ Harrington, Jr., Joseph E., 2008, Detecting Cartels, in Buccirossi, Paolo (Eds.), Handbook of Antitrust Economics, MIT Press: Massachusetts, 213-258, pp. 244-246. Athey, Susan and Kyle Bagwell, 2001, Optimal Collusion with Private Information, The RAND Journal of Economics, Vol. 32(3), 428-465, which is the source of the underlying model.

¹⁰⁹ Grout, Paul A. and Silvia Sonderegger, 2005, Predicting Cartels, Office of Fair Trading, pp. 37-56 and Annexe B.

¹¹⁰ Grout, Paul A. and Silvia Sonderegger, 2005, Predicting Cartels, Office of Fair Trading, pp. 37-56 and Annexe B.

¹¹¹ “Allowing for a sophisticated cartel design, we find here that optimal collusion is complex, with considerable market-share instability.” Athey, Susan and Kyle Bagwell, 2001, Optimal Collusion with Private Information, The RAND Journal of Economics, Vol. 32(3), 428-465, p. 460.

market share instability.¹¹² The market shares of members of the Florida school milk bid rigging cartel of the 1980s fluctuated substantially.¹¹³ Despite the European paperboard cartel's focus on maintaining stable market shares, the European Commission found that, "the share of some large individual producers did creep up from year to year. ... No doubt producers in a position to negotiate from strength would expect an increased share in the market. ... The understanding between the producers on market share was thus not static but was subject to periodic adjustment and re-negotiation."¹¹⁴

C. The operation of the cartel is consistent with an effective cartel

Prof. Willig claims that documentary evidence indicates that the cartel was not effective; the basis for his claim is that sometimes some cartel members suspected that SDI (or Samsung Display Devices, SDD) undercut the agreed target prices ("cheated"), and that cartel members found other cartel members' pricing to be "opaque."¹¹⁵ The documentary evidence cited by Prof. Willig fails to support his claim for several reasons: (i) cartels can be effective despite the presence of cheating; (ii) Prof. Willig's documentary evidence shows only suspicions of cheating; (iii) his narrow anecdotal documentary evidence cannot substitute for the quantitative analysis I have presented of the extent to which actual prices matched cartel target prices, using all suitable price data available; and (iv) Prof. Willig ignores the operating practices of the cartel that addressed operational challenges such as cheating and the opacity of pricing.

Prof. Willig conflates "cheating" and "ineffectiveness". An effective cartel is one that causes prices to be above the competitive level.¹¹⁶ Cheating is undercutting target prices; it is not fully-competitive pricing. For example, if, absent the cartel, the price of a particular CRT model would have been \$100, and the cartel set a target price of \$110, then a price of \$108 is cheating, but it is also effective cartelization, for it imposes an overcharge of \$8 above the competitive price. A cartel cheater is able to charge supracompetitive prices because compliance with the target price (even partial compliance) by other cartel members allows the cheater to avoid real competition and to set prices above the level that it could achieve absent the cartel. Prof. Willig's claim that some cartel members suspected other cartel members of cheating, even if true, cannot, therefore, support his conclusion that the cartel was not effective.

To the extent that Prof. Willig's claim is that actual prices were below target levels, the documentary evidence he presents¹¹⁷ is only anecdotal evidence of suspicions of cheating by

¹¹² "Several recent price-fixing cartels engaged in various forms of intertemporal market sharing including the citric acid cartel of 1991-95 (Connor, 2001), the graphite electrodes cartel of 1992-97 (Levenstein, Suslow, and Oswald, 2004), and the vitamins cartel, in particular vitamins A and E over 1989-99 (European Commission, 2003)." Harrington, Jr., Joseph E., 2008, Detecting Cartels, in Buccirosi, Paolo (Eds.), Handbook of Antitrust Economics, MIT Press: Massachusetts, 213-258, pp. 245-246.

¹¹³ Pesendorfer, Martin, 2000, A Study of Collusion in First-Price Auctions, The Review of Economic Studies, Vol. 67(3), 381-411.

¹¹⁴ European Commission, 1994, Decision No. 94/601/EC (Cartonboard), Official Journal of the European Communities.

¹¹⁵ Willig Report, ¶¶88-91.

¹¹⁶ Prof. Willig agreed with this definition of cartel "effectiveness" at his deposition. Willig Dep., pp. 41:14 - 42:23.

¹¹⁷ Willig Report, ¶¶88-91.

other cartel members, unsubstantiated by data that compares actual to target prices. Narrow anecdotal evidence of this sort cannot gainsay a quantitative analysis of the extent to which actual prices matched target prices. I submitted such evidence in my Original Report, and have updated it in this report.¹¹⁸ Prof. Willig claims that his anecdotal evidence is “supported by data on actual CRT prices” and refers to a comparison of actual to target prices, but he cites to no analysis.¹¹⁹ If he refers to the regression he discusses in subsequent paragraphs,¹²⁰ that analysis is not a comparison of actual to target prices; I discuss that aspect of its failure in Section VII.D.5 below. I discuss his Exhibit 19 in Section VII.D.4 below.

The CRT cartel was effective because it put in place operating practices that allowed it to overcome the usual challenges faced by cartels, such as cheating. The CRT cartel’s successful practices included frequent meetings, sharing of information on pricing, coordination of output restrictions, division of the market, and monitoring.¹²¹ Prof. Willig cites the presence of challenges (such as suspicions of cheating) as if that alone were evidence that the cartel was not effective; if that were true, no cartel would be effective, for all cartels face challenges.¹²² In fact, the interaction between cartel members highlighted by Prof. Willig is exactly what is expected of successful cartels. Prof. Willig quotes from notes documenting a May 1998 cartel meeting in which a cartel member (Orion) accused Samsung of cheating on price agreements in order to expand market share.¹²³ The full quote reads:

In addition, Mr. Moon claimed that he believed that SDD had strong ambitions to expand M/S [market share], and that its major strategy is to “kill the competing makers”. So he was suspicious about SDD’s attitude toward holding prices. (Mr. Moon claimed that it had encountered low price competition with a customer from SDD’s Shenzhen plant, but he was not willing to disclose which customer.) **Director Liu noted that SDD was the one who initiated this meeting for price resolution. So it should have the sincerity to hold the price. If Orion heard from the customer about any issues regarding SDD/PH’s [Philips] not abiding by the resolution and competing with low prices in secret, it should please inform CPT [Chunghwa]. CPT will then complain to SDD / PH.**¹²⁴

Prof. Willig omits Chunghwa’s response, which was to outline the process by which the cartel handled accusations of cheating. Should Orion encounter any further evidence that Samsung was

¹¹⁸ See Exhibit RR-15, and Exhibits 14 – 17 of my Original Report. Exhibits 26 and 27 are similar analyses, focusing on CRTs made and sold in the NAFTA region.

¹¹⁹ Willig Report, ¶90.

¹²⁰ Willig Report, ¶¶92-100.

¹²¹ See my Original Report, Section VIII.A.2 for a detailed discussion of the operating practices of successful cartels that the CRT cartel adopted.

¹²² “Cartels do face challenges... But successful cartels have operated in a wide variety of industries by developing organizations that can overcome these challenges.” Levenstein, Margaret and Valerie Suslow, March 2006, What Determines Cartel Success?, Journal of Economic Literature, Vol. 44., p. 44.

¹²³ Willig Report, ¶88.

¹²⁴ Chunghwa Picture Tubes and LTD, 18 May 1998, Customer Contact Report, Content: CDT Price Discussion, CHU00028952 - CHU00028954 at 8954.

cheating on its agreements, the company should report that information to Chunghwa, which would then discuss the accusations with Samsung. This type of information exchange, communication, and policing is exactly what is expected of successful cartels – when faced with a suspected incident of unauthorized price cutting cartel members discuss the incident and attempt to restore pricing discipline without resorting to an all-out price war.¹²⁵

D. The relationship between actual and target prices shows that the cartel was effective

1. The existence of a price structure leads to common impact

To evaluate whether the cartel was successful, I match target prices from cartel meeting notes to the actual prices in the sales data produced by the defendants. This involved reviewing cartel meeting notes to determine which listed a target price, the type of CRT the target price applied to, and the date when the target price was effective. I calculated actual prices from Defendants' sales data, aggregating to the same degree as the target prices.¹²⁶ Since my original report I updated my price matching analysis in two ways.

I have identified and reviewed additional cartel meeting notes which contained target prices and added these new data to the pool of target prices I used in my original analysis. The search for new target prices was in response to criticism that the target prices did not cover enough of the class period to be meaningful.¹²⁷

In addition, I determined to a reasonable degree of certainty the finish for a number of target prices for CDTs for which tube finish was not specified in the original set of cartel meeting notes. Specifically, out of 2,246 target prices for CDTs I identified, 2 target prices have bare finish, 656 target prices have non-bare finish, and the remaining 1,588 do not specify finish. Since finish is one of the tube characteristics I use to match target prices to actual prices, these target prices were not used in my original analysis. Further investigations reveal virtually no CDT target prices in the cartel meeting notes with bare finish. Therefore, in my updated price-matching analysis I treat target prices for CDTs that do not specify finish as non-bare. Such an assumption is further supported by the fact that only 2.2% of CDTs in the Defendants' sales data were sold bare.

I present updated results from comparing 4,769 target prices to actual prices in Exhibit RR-15.¹²⁸ A comparison of cartel target prices to prices actually charged to buyers shows that 39% of the

¹²⁵ “In each of these cases, successful collusion required the development of alternative organizational responses both to actual violations of the collusive agreement and to events that were, absent further investigation by the cartel, observationally equivalent to violations. As repeatedly discovered by these cartel members, the threat of Cournot reversion [i.e., price war] is an inefficient way to sustain collusion.” Levenstein, Margaret C. and Valerie Y. Suslow, 2006, What Determines Cartel Success?, *Journal of Economic Literature*, Vol. XLIV, 43-95, p. 78.

¹²⁶ For a detailed description of the price matching analysis, see Section VIII.A.3 of my Original Report.

¹²⁷ Memo in Opp., pp. 31:10-32:13.

¹²⁸ In my Original Report, I presented the results from price-matching in two ways. In Exhibit 14 I presented the average difference between actual and target prices for each month in the damages period. Prof. Willig objects to the presentation because it does not indicate the range of differences in each month; Willig Report, ¶107. While my Exhibit 14 does include averages of the results, in Exhibit 15 I summarize all actual-target price comparisons. The

CRTs were sold at prices within 5% of the target price. The cartel was able to charge prices at least 95% as high as the cartel target price 58% of the time, while only 13% of CRTs sold during the cartel period were sold at prices more than 15% below the cartel's target price.

2. Grouping of Defendants' data is appropriate given target prices set by the cartel

The target prices recorded in the cartel meeting notes varied greatly in their specificity. Nearly all indicated the size and application of the CRTs to which they applied and the period for which they were effective and many indicated finish or curvature as well. Less often, meeting notes indicated that a target price applied to CRTs with more specific characteristics, including frequency, dot pitch, and coating. Similarly, the data on actual transactions included enough information to infer the application, size, and finish of the CRTs in nearly all cases and curvature or other characteristics for a much smaller share.¹²⁹

When comparing target and actual prices, I had to decide how precisely to match the two prices based on specified characteristics. Using few characteristics would allow me to make a greater number of comparisons, ensuring my results applied generally. Using more would allow me to match target and actual prices with greater precision. I ultimately chose to match prices based on date, size, application, and finish. This allowed me to make a comparison between target and actual prices for a large portion of the transaction data while remaining confident that target and actual prices had been matched with relative accuracy.

3. Matching global target prices to global actual prices is appropriate

Prof. Willig claims that regional markets, with unique price dynamics, existed for CRTs.¹³⁰ I find Prof. Willig's reasoning and data analysis to be flawed. In Section VII.F, I discuss how a global market existed for both CRT monitors and CRT TVs, which allowed for the end-consumption of CDTs and CPTs to take place outside the region in which they were manufactured or sold. To show that cartel target prices were applicable at the global level, I compare actual prices of CPTs made in North America – a region that Prof. Willig claims had differentiated prices – to cartel target prices for CPTs, and find significant matching. See the results in Exhibit 27. I therefore conclude that my original analysis, which compared global target prices to global actual prices, was entirely appropriate.

4. Prof. Willig's price-matching criticisms are flawed

In Exhibit 19, Prof. Willig claims to perform a robustness check that accounts for the lack of precise target prices for specific models.¹³¹ He says that “after accounting for [the] lack of precision” in my ability to identify precise target prices, only 48% of actual prices fall within the

range of matches is indicated; some actual prices are 55% of the target prices and some are 155% of the target prices.

¹²⁹ See Section VI.A for more information on how product characteristics were inferred from model numbers.

¹³⁰ Willig Report, ¶18.

¹³¹ Willig Report, ¶110.

ranges he created and 30% of sales volume was below the “lowest potentially applicable” target price. He concludes that the cartel’s “actual prices frequently deviated from target prices.”¹³²

Having considered Prof. Willig’s discussion of the price-matching analysis, my opinion that the actual prices charged by the Defendants were broadly consistent with the cartel’s target prices is unchanged. As I explain below, the analysis Prof. Willig presents in his Exhibit 19, contrary to his claims, generally fails to account for imprecise matching. More importantly, even if Prof. Willig had accounted for imprecision in matching target and actual prices *and* had found that a majority of prices were outside the target price ranges he created, it would not be evidence the cartel was unsuccessful or even intermittently unsuccessful. The cartel does not have to have perfectly achieved its target prices to have elevated prices above the but-for level. See the discussion in Section VII.C.

Prof. Willig’s analysis in Exhibit 19 fails on more than just a conceptual level. He says it examines whether a given actual price is between “the lowest potentially applicable target price” and “the highest potentially applicable target price”.¹³³ Although Prof. Willig presents this as a generous construct that is conservative from his point of view (that is, biased to be favorable for the Plaintiffs), his analysis is, in fact, not dramatically different from the very conservative analysis presented in my original report.¹³⁴

Prof. Willig creates target price ranges by grouping target prices that have the same values for effective date, application, size, finish, and manufacturer.¹³⁵ Prof. Willig then subtracts 5% from the minimum target price and adds 5% to the maximum target price in each group to create the target price range. In theory, this approach is capable of creating credible ranges that could underlie an assessment of the degree to which actual prices are relatively close to target prices. However, Prof. Willig’s target price *ranges are not credible* because he assumes the target price differential for differences in any given attribute (e.g., shape) goes to zero if he does not observe that specific differential in every observation that mentions the attribute.

For example, Prof. Willig fails to account for the difference between round and flat 21" CPTs unless the difference is explicit in the target price data. His range in November 2003 for 21" ITC CPTs produced by Chunghwa is based on target price data that include prices for both round and flat tubes. The result is a range spanning \$18.50, from \$35.75 to \$54.25.¹³⁶ In December 2003, the target price range for 21" ITC CPTs produced by Chunghwa contracts, spanning only \$5.25, from \$49.875 to \$55.125. This contraction occurs because the target price data have only a target price for a flat tube.¹³⁷ By 2005, the data again have prices for both flat and round 21" ITC CPTs

¹³² Willig Report, ¶110.

¹³³ Willig Report, ¶110.

¹³⁴ Section VII.D.1 and Original Report Exhibit 15.

¹³⁵ For example, Prof. Willig would look at the range of target prices for a Chunghwa 21" bare CPT on a given date. He would consider both flat and round target prices. Target prices for Chunghwa 21" ITC CPT for the same date would be a different group. Target prices that don’t specify finish are dropped, as was done in my analysis.

¹³⁶ CPT, 08 September 2003, CPT Glass Meeting Result Report, SDCRT-0088732 - SDCRT-0088733 at 3.

¹³⁷ The range of \$5.25 is the observed target price for flat tubes $\pm 5\%$. That is similar to my reporting of the share of units with prices between 95% and 105% of the target price in my Exhibit 15. The target prices are from MT Picture Display, 28 November 2003, 2003 Q3 & Q4 Sales Review, MTPD-0580726 at 0726.

produced by Chunghwa and Prof. Willig's approach again produces a meaningful target price range. These contractions and expansions of the target price range for 21" ITC CPTs produced by Chunghwa are shown in Exhibit 28. Failing to observe target prices for round tubes for some periods while having prices for flat tubes, his analysis assumes the cartel stopped using differential pricing based on shape.

The result is that almost 60% of Prof. Willig's target price ranges are not target price ranges at all – they are merely a band of $\pm 5\%$ from the single target price in a given group.¹³⁸ A range of $\pm 5\%$ from the single target price is no different than the analysis I performed, a conservative analysis intentionally constructed to make it *difficult* to show that actual prices reasonably matched target prices.

Prof. Willig's claim to have considered the "lowest [and] highest potentially applicable price" is sensible only if one believes the cartel decided in December 2003 to charge the same (high, flat) price for both round and flat 21" ITC CPTs, pursued this policy for over a year, then reverted to charging lower prices for round and higher prices for flat tubes, and then later in time switched again to charging a single (high, flat) price for both round and flat 21" ITC CPT. An alternative explanation for the evidence is that the cartel members were cognizant of the *price structure* of the market, the relationship between round and flat prices. They recognized that it wasn't necessary to discuss every price within the structure at every meeting. This latter interpretation fits well with the CDT evidence, wherein the cartel set price increments for various features and addressed them only intermittently.¹³⁹

A simple adjustment to Prof. Willig's study does create ranges that would be suggestive of the results that would have been obtained if Prof. Willig had actually created realistic "minimum potentially applicable" and "maximum potentially applicable" ranges. I re-ran Prof. Willig's Exhibit 19 analysis, but kept only those observations having actual ranges derived from multiple target prices; that is, I drop all observations where the target price range is based on a single price. The analysis looking only at such ranges finds over 60% of actual prices were within his ranges.¹⁴⁰ That degree of price consistency is quite good, given the impact of exchange rate volatility, lack of controls to eliminate non-commercial transactions, and product differentiation in the market. Rather than contradicting my conclusion that actual prices are broadly consistent with cartel target prices, Prof. Willig's analysis supports it.

5. Prof. Willig's regression analysis is not a useful analysis to determine whether the cartel was effective

Prof. Willig argues in his report that if the cartel effectively controlled actual prices, then changes in target prices ought to be mirrored in actual prices. As an example, Prof. Willig writes that the target price for 15-inch CDTs increased by \$5 to \$60 in August 1998 and that "[if]

¹³⁸ Fifty-seven percent (57%) of target price ranges in his analysis, 336 of 585, are the result of one target price. See Willig Exhibit 19 Price Ranges for Floating Bar Charts.log in my backup production.

¹³⁹ See, e.g., price differentials for tubes that follow TCO vs. MPRII standards, MPRII vs. Glare/Anti-glare, 57 Khz vs. 48 Khz, and 95 Khz vs 85 Khz. Chunghwa Picture Tubes and LTD, 30 October 2003, CDT Market Review, CHU00031209 - CHU00031213 at 1210.01E, and price gap between normal and flat. Samsung, Undated, SDCRT-0087007, SDCRT-0087007 - SDCRT-0087440 at 7397.

¹⁴⁰ See Willig Report Exhibit 19 with no Single Point Ranges.log in my backup production.

Defendants adhered to the alleged target prices when setting their actual sales prices, then their actual 15" CDT sales prices should have increased by an amount approximately similar to the alleged increase in the target price of \$5 during the relative periods.”¹⁴¹ I inspected the data to determine whether the change in the target price of 15" CDTs in August 1998 was reflected in actual prices. I found that the average price for 15" CDTs increased by about \$4.50 between June and August 1998 (see Exhibit 29). Though simply anecdotal, Defendants seem to have adhered to the alleged target prices in this case that was highlighted by Prof. Willig.

Prof. Willig then proceeds to assess the relationship between changes in target and actual prices using a univariate (simple) regression analysis (Exhibit 16) and a visual inspection of the data (Exhibit 17A). These analyses, he claims, provide evidence that the relationship between the changes in target prices set by the cartel and the changes in actual prices is weak and that the cartel in the CRT industry “was either ineffective or at least was not uniformly effective” if it existed at all.¹⁴²

These analyses suffer from three primary flaws which render their results unreliable. First, and fatally for these analyses, Prof. Willig does not account for the impact of exchange rate changes. Second, his Exhibits 16 and 17 are conceptually misguided and are incapable of supporting his opinions about the effectiveness of the cartel even if they weren’t beset with methodological errors. Third, by calculating changes in target prices between different types of CRTs, Prof. Willig constructs artificial and misleading data.

a) Prof. Willig’s regression is nonsensical

Prof. Willig’s test of cartel effectiveness is predicated on the false assumption that if changes in target prices alone do not explain changes in actual prices, then target prices are ineffective in causing actual prices to be supracompetitive.¹⁴³ The assumption is false because CRT prices are affected by more than just the cartel’s target prices; CRT prices are also influenced by market conditions, as Prof. Willig’s own analyses (in other contexts) show. For example, Prof. Willig acknowledges that CRT prices were affected by competition from LCD and plasma displays.¹⁴⁴ Other influences on CRT prices include consumers’ incomes, changes in consumers’ tastes, growth in computer usage, inventory, and manufacturing costs. The change in CRT prices from month to month is the net effect of all of these things, in addition to any change in the overcharge imposed by the cartel. Suppose the cartel sets its target price higher than the target price that held the previous month. When the target price becomes effective, the observed actual price may be higher than it was the previous month, but it may also be lower, even if all cartel members attempt to enforce the target, if the effect of all other influences on price are negative and larger in magnitude than the increase in the target price. Prof. Willig acknowledged at his deposition that when sales prices are falling, an “effective cartel... prevents prices from falling as far as they would have absent the cartel or as quickly.”¹⁴⁵

¹⁴¹ Willig Report, ¶91.

¹⁴² Willig Report, ¶¶92-10.

¹⁴³ Willig Report, ¶92.

¹⁴⁴ Willig Report, ¶58.

¹⁴⁵ Willig Dep., pp. 41:14 - 42:23.

Sales price will decline over time despite an effective increase in target price whenever a downward trend has a stronger effect on price than the upward effect of a cartel target price increase.¹⁴⁶ Of course, the reverse is possible, too, if the effect of the target price increase is greater than any downward trend. In sum, when a target price increases, actual sales prices may increase over time, or it may decrease over time, or it may stay the same given other determinants of price. The ability of target price changes alone to predict actual price changes is therefore not a valid test of cartel effectiveness.

Prof. Willig's "test of cartel effectiveness" is invalid because he chose a model that attributes, in error, all changes in sales prices to the effect of the cartel alone. He made this choice despite his awareness that market conditions, too, affect CRT prices, and that CRT prices generally trended downward during the relevant period.¹⁴⁷ He was not forced to make this choice by any dearth of alternatives: standard methods exist for estimating the independent effect of multiple variables, such as the independent effect of target prices, after controlling for the effect of market forces on sales prices.

b) Prof. Willig's regression is based on unreliable data

When calculating changes in target prices, Prof. Willig first identifies groups of target prices that specify the same application, size, finish, and manufacturer – for example, one group is all target prices for 14" bare CDTs sold by Chunghwa. He then sorts the target prices by date and calculates the month-to-month change between consecutive target prices. In many cases, the target prices which Prof. Willig compares share the same application, size, finish, and manufacturer, but differ in other respects; for example, he often compares target prices for flat CRTs to those for curved CRTs. As a result, Prof. Willig frequently calculates changes in target prices when none have occurred or incorrectly calculates the magnitude of those that have.

An example, presented in Exhibit 30, will make the point concrete. It is helpful to remember that Prof. Willig always matches on finish (that is, he only compares bare prices to bare prices and ITC prices to ITC prices) but ignores shape (that is, he may compare flat prices to round prices or combine flat and round to create an average). I illustrate the problems of ignoring shape with an example from the data. Among the data underlying Prof. Willig's Exhibit 17A are target prices for 21" CPTs manufactured by MTPD, with effective price dates of November 2003 and January and March of 2004. In November 2003, Prof. Willig has prices of \$38 and \$52 for, respectively, round and flat, 21" ITC CPTs. In January 2004, the only MTPD 21" ITC price Prof. Willig has is for a flat CPT. (These are the red dot, square, and circle on the graph.) The solid red line reflects the comparison Prof. Willig made: the average of the round and flat prices observed in November 2003 (\$45) to the flat price observed in January 2004 (\$51). He concludes MTPD's 21" ITC target price increased at a monthly rate of 6.5%. In fact, the comparison he should have made (the dashed red line, accounting for shape by comparing flat to flat), shows MTPD's target price decreased by almost a 1% monthly rate (from \$52 to \$51).

¹⁴⁶ Prof. Willig cites my deposition testimony to claim that I would expect a 5% change in a target price to be accompanied by a 5% change in sales price. My answer should have explicitly included the standard qualification "other things equal". In the current context, that would mean "in the absence of changes in other determinants of price", so that the sole effect on the sales price is the change in the target price. See Willig Report ¶94 and Netz, Janet S., 15 November 2012, Deposition of Janet S. Netz, Ph.D (Hereinafter "Netz Dep."), p. 104.

¹⁴⁷ See footnotes 144 and 145.

Similarly, Prof. Willig has a price of \$46 for a flat, 21", bare CPT in January 2004. In March 2004, Prof. Willig has prices of \$35 and \$46 for, respectively, round and flat, 21" bare CPTs (the blue dot, circle and square). He compares the single January bare price to the average of the March bare prices – \$46 vs. \$41 – and concludes target prices decreased at a monthly rate of 6.2% (the solid blue line). In fact, MTPD's 21" CPT target price was unchanged (\$46 for bare, flat in both January and March 2004, the dashed blue line).

Prof. Willig thus conflates changes in product composition – a flat CPT price is compared to an average comprised of flat and round CPTs – with changes in prices. His failure to distinguish between changes in product mix and changes in price renders his measurement of changes in target prices unreliable.

Prof. Willig compounds this error by failing to consider the impact of exchange rate volatility on the sign, magnitude, and frequency of the changes in actual prices used in his analysis.¹⁴⁸ Prof. Willig calculated the change in actual transaction prices in terms of U.S. dollars. Since many transactions were conducted and recorded in foreign currencies, fluctuations in exchange rates account for a share of the variation in prices which have been converted to U.S. dollars. If, for example, a CRT was sold at 100,000 won on March 1st, 1998 and April 1st of the same year, the corresponding price in U.S. dollars would have increased from \$61.16 to \$71.84 due to a change in the dollar-won exchange rate. Prof. Willig's methods "identify" changes in actual prices when none occurred and can mischaracterize the sign and magnitude of the change when they did.

It is important to be clear on the impact of these errors. In both cases, the measurement of target price changes and the measurement of actual price changes, the errors made by Prof. Willig do not merely introduce some noise into his measurement of a given price change. Rather, these errors mean that Prof. Willig's measures of change are completely unrelated to actual changes in the variable of interest.

The effect of these errors is most easily recognized in Prof. Willig's Exhibit 17. His failure to reliably calculate meaningful changes in target prices means the X-axis (or side-to-side) location of points is unreliable. In particular, many of his points that reflect a percentage change in the target price should be located at zero, because there was no change in target price if one properly controls for the products to which target prices apply. His failure to remove exchange rate noise from his measurement of actual transaction prices means the Y-axis (of up-and-down) location of points is also unreliable. The combination of these errors means the locations of the points on his graph are unreliable and, therefore, there can be no expectation that the points would exhibit any meaningful relationship. While more difficult to visualize, the impact on Prof. Willig's Exhibit 16 is identical: Prof. Willig regresses an unreliable measure of changes in transaction prices on an unreliable measure of changes in target prices. Again, it is unsurprising he fails to find a relationship between his two nonsensical measures.

Both flaws speak to a common theme, which is Prof. Willig's repeated failure to consider the impact of seemingly minor details on his conclusions. This failure speaks to the lack of rigor evident in Prof. Willig's analysis and renders his conclusions misleading and unreliable.

¹⁴⁸ I addressed Prof. Willig's mishandling for foreign currency denominated transactions in greater detail in Section VI.B.

E. The existence of a price structure is evidence that direct purchasers suffered common impact in the form of higher prices

I begin by re-stating what I mean by “price structure”, and why the existence of a price structure is evidence that the cartel caused all prices to be supracompetitive. Next, I show that Prof. Willig’s evidence is consistent with the existence of a price structure. Finally, I review Prof. Willig’s conclusions, and show that virtually all of them are inconsequential statements that are entirely consistent with the existence of a price structure.

1. A price structure causes the cartel to have a common impact on direct purchasers

In my Original Report, I showed that CRT prices have what I call a price structure, and explained that the existence of a price structure forms part of the basis for my conclusion that all direct purchasers of CRTs paid supracompetitive prices.¹⁴⁹ In Section VII.E below, I restate the basis for my conclusion that the existence of a price structure is evidence that the CRT cartel’s anticompetitive conduct caused all CRT prices to be above their levels in the but-for world.

a) What a price structure is

I begin by restating what I mean by the term “price structure”. As I discussed in my original report (Section VIII.B.1.) and in this report in Section VI.A.2, CRTs are differentiated products, with the most important differentiating product characteristics being application (for monitors or for TVs), size, shape, and finish. Prices of CRTs follow certain regularities with respect to these characteristics that differentiate them: for example, at any point in time, all other characteristics equal, larger CRTs are priced higher than smaller CRTs and flat CRTs are priced higher than round CRTs.

The but-for world differs from the actual world only with respect to the challenged conduct. Therefore, CRT products in the but-for world would be differentiated, just as in the actual world, and product differentiators (such as flat screens or larger screens) would have received price differentials in the but-for world, just as in the actual world. Similarly, in the but-for world CRT manufacturers would have had relationships with certain buyers, just as they did in the actual world; CRT manufacturers would have offered special price concessions to these buyers in the but-for as well as the actual world. I use the term price structure as a shorthand to refer to all of these qualitative and categorical characteristics of CRT prices that are the same in the actual and but-for worlds. The price structure therefore includes price differentials at a point in time associated with product differentiation and price differentials at a point in time due to buyer-seller relationships.

The relative prices that are reflected in the price structure are substantially the same in the actual world as in the but-for world. Relative prices are ratios of prices at a point in time; if both prices change by the same percentage, the relative price is unchanged. Relative prices are substantially the same in the but-for world as in the actual world because they are largely determined, in both the competitive but-for world and the cartelized actual world, by the underlying characteristics of CRT demand and supply, including consumers’ willingness to pay for product differentiation in the CRTs of the finished products and CRT manufacturers’ costs of producing product

¹⁴⁹ Original Report, Section VIII.B.

differentiators. The difference between actual and but-for CRT prices is due solely to the exercise of market power by the cartel. The exercise of market power may cause relative prices to change, but its primary effect is on price levels, not the relationship between prices; a cartel would choose relative prices similar to the relative prices that would prevail in the but-for world.

b) A price structure can exist even if price relationships change over time. Prof. Willig presents evidence that relative prices changed over time and asserts that shows a price structure does not exist.¹⁵⁰ I address Prof. Willig's evidence in Section VII.E.2; here I use an example to illustrate that a price structure that changes over time (that is, the price of a 15" CRT is higher than a 14" CRT in both time periods, but the magnitude of the price difference between a 15" and a 14" CRT is different in each period) is completely consistent with a common impact.

Suppose that there are two CRTs, called A and B. CRT B is more expensive than CRT A; this would be consistent with CRT B having a larger size or being flat while CRT A is a smaller size or is round). Assume the *relative* prices in the actual world were exactly the same as in the but-for world. For example, if the price of CRT B is twice the price of CRT A in the actual world, as shown in the table below in August, assume that the price of CRT B is twice the price of CRT A in the but-for world as well.¹⁵¹

The following table illustrates that common impact is consistent with prices that change over time and relative prices (or what I call the price structure) that change over time, contrary to Prof. Willig's claims.

	August	September
Actual Prices		
CRT A	110.00	115.00
CRT B	220.00	240.00
Price of B Relative to A	2.0	2.1
But-for Prices		
CRT A	100.00	105.00
CRT B	200.00	219.13
Price of B Relative to A	2.0	2.1
Overcharge (= (actual price – but-for price) / but-for price)		
CRT A	10.0%	9.5%
CRT B	10.0%	9.5%

My conclusions do not require that relative prices be the same in the actual and but-for worlds, as in the illustration above. I present this illustration to show that the price structure to which I

¹⁵⁰ Willig Report, ¶14.

¹⁵¹ I do not claim this is true; the assumption simply makes the illustration easier to understand.

testify does not require anything resembling the rigid structure described by Prof. Willig, in which prices and relative prices never change.¹⁵²

c) The cartel raised the entire price structure

In this section, I show that the cartel had the incentive to cause all prices to be supracompetitive, and that a market mechanism provided the means for the cartel to cause the entire price structure without setting target prices of all CRTs.

Rational cartelization requires that all or most CRT prices be raised above the competitive level. Suppose the cartel raised the price of 15" CDTs above the competitive level, but left the price of 14" CDTs at the competitive level. Some consumers would substitute away from the 15" model towards the 14" model, thereby escaping the price increase. Rational cartelization (that is, operating the cartel in such a way that firms increase their profits relative to the competitive outcome by as much as possible) requires that the cartel set prices that eliminate such opportunities for buyers to escape overcharges. Thus, in this hypothetical example, the cartel would earn higher profits by raising the prices of 14" and 15" CDTs. In that way, consumers cannot substitute to 14" CDTs to avoid the overcharge. This same logic applies to 17" CDTs, flat versus round CDTs, bare and ITC CDTs, etc. More generally, the cartel's choice of prices seeks to maximize profit; doing so requires applying the cartel overcharge over products in such a way that substitution by consumers has the least impact on profits. It is unlikely that the cartel would choose an overcharge of zero on any CRT, for the reason illustrated above.

The cartel need not explicitly fix the price of the 14" CDT in this example in order to cause its price to be above the competitive level; setting the price of the 15" CDT causes the price of substitutes for it (the 14" CDT among them) to rise, due solely to market forces, without any explicitly-set target price for the 14" CDT model. This is because buyers' willingness to pay for any good depends in part on the prices of substitute goods, so when the cartel raises the price of the 15" CDT, buyers of the 14" CDT become willing to pay more for it than they would be willing to pay if the price of the 15" CDT were at the competitive level; this greater willingness to pay will be reaped, at least in part, by CRT manufacturers in the form of higher prices for the 14" CDT and any other substitutes for the 15" CDT. By this market mechanism, the cartel can achieve its goal of causing all CRT prices to be supracompetitive without setting target prices for all of them.

The cartel therefore had the incentive to raise all CRT prices, and a market mechanism by which the cartel could cause all prices to be supracompetitive by setting prices for only a subset of CRT

¹⁵² As I showed in footnote 159, most of the evidence Prof. Willig presents in opposition to my claim that a price structure exists consists merely of changes in price over time or changes in relative prices over time. Prof. Willig apparently believes that in the price structure I claim, prices must all move together and therefore relative prices cannot change. He said in his expert report that "Dr. Netz's 'price structure' theory is inconsistent with the heterogeneity and diversity observed in the CRT pricing data during the class period. Specifically, ... prices of CRTs did not move together." Willig Report, ¶14. At his deposition, he confirmed that he misunderstands my claim to be that relative prices do not change over time: "Exhibit 10A shows or exhibits what the data shows [sic], which is that the price premiums for size actually vary quite substantially year over year when the assumption is not made that they must be the same in every year. And that bears very directly on the question of price structure because if the size premiums change over time, that means her idea of a price structure is not at all validated by her regressions. And she says they are." Willig Dep., p. 126:13-23, emphasis added.

models.¹⁵³ Prof. Willig has not challenged the logic of this argument on the record. Given that we have, to date, found target prices covering at least 26% of CRT sales,¹⁵⁴ I conclude that the cartel's anticompetitive price fixing and output restriction caused all CRT prices to be above but-for levels.

d) A price structure exists

In my Original Report, I presented the documentary and statistical evidence that a price structure exists.

(1) Documentary evidence of a price structure

The cartel explicitly created structure in its target prices by setting price differentials. For example, one cartel meeting document says that “[t]he price differentials for Coating, Frequency, and Dot Pitch will be, respectively, USD 3/pc, USD 2/pc, and USD 5/pc”. These price differentials create, for each product, target prices for seven additional products. This automatically creates a large number of price relationships of the type represented in a price structure.¹⁵⁵ By creating this structure, the cartel ensured that when it set the target price of standard models, the target prices of the seven additional premium models were affected at the same time.

(2) Statistical evidence of a price structure

Cartel target prices exhibit a structure: my hedonic regression analysis of target prices¹⁵⁶ shows that CRT prices are well-explained by a function of the characteristics of the CRTs subject to price fixing, whether the purchase is made by a major buyer, and a time trend. This function is manifestly a price structure, and the fact that it fits the cartel's target prices so well demonstrates that most of the dispersion in the cartel's target prices is due to objective characteristics of transactions. Since I submitted my Original Report, I have found additional target prices set by the cartel; I have augmented my target price dataset with these new target prices and re-estimated my hedonics regressions. The results are virtually unchanged from those in my Original Report: my hedonics regressions show that common factors explain 98% of the variation in CPT target prices and 91% of the variation in CDT target prices.¹⁵⁷

The cartel's CRT sales prices also exhibit a price structure: they are well-explained by a function of the characteristics of the CRT sold, the buyer-seller pair involved in the transaction, and a time trend.¹⁵⁸

¹⁵³ The “subset” of models for which we observe target prices is generally quite broad, covering a substantial range of sizes but at times lacking details about specific variations along non-size attributes.

¹⁵⁴ I calculate this share as the share of all unit sales in Def. data which match a target price on application, size, and date. The calculation is performed by running PriceMatch.do and eliminating the match on finish.

¹⁵⁵ See Original Report, p. 67 (footnotes omitted).

¹⁵⁶ See Original Report, p. 68.

¹⁵⁷ See Exhibits RR-19 and RR-20.

¹⁵⁸ See Original Report, Section VIII.B.1.e).

Notably, the two price structures – actual and target – are very similar. The cartel chose precisely the factors that are the primary market price determinants as the focus of its target price structure.

2. Prof. Willig's evidence regarding heterogeneity is consistent with the existence of a price structure

a) Summary of Prof. Willig's assertion that a price structure does not exist

Most of Prof. Willig's exhibits are introduced in the section of his report questioning the existence and implications of a price structure, and purport to show price heterogeneity.¹⁵⁹ Prof. Willig recites this evidence as if price heterogeneity alone refutes the existence of a price structure, with no explanation of how it could. Even if his evidence of heterogeneity were valid, which it is not,¹⁶⁰ it would not refute the existence of a price structure, as I show in this section of my report.

A price structure describes the relationships between prices at a point in time.¹⁶¹ The textbook economic logic by which I show that the cartel's conduct caused common impact is also about prices at a point in time.¹⁶² Price differentials at a point in time, such as higher prices for larger CRTs than for otherwise-identical smaller CRTs in the same month, are not only consistent with the existence of the price structure, they are integral to it. In Section VII.E.2.c)(1) below, I show that price heterogeneity at a point in time is explained by common factors, and that this evidence therefore supports the existence of a price structure.

All remaining evidence of heterogeneity in Prof. Willig's exhibits consists of evidence that CRT prices changed over time. As explained in Section VI.B, Prof. Willig's analyses of price changes are unreliable because he does not take into account foreign exchange rate changes. Even if prices changed over time as much as Prof. Willig claims, it would be entirely consistent with the existence of a price structure, as I show in Section VII.E.2.c)(2). Because evidence that prices changed over time is consistent with the existence of a price structure, such evidence cannot provide the basis for a conclusion that a price structure does not exist. Yet most of Prof. Willig's

¹⁵⁹ Prof. Willig introduces twenty exhibits in the section of his report related to the existence of a price structure (Willig Report, Section III.A). Three of these exhibits are related to finished goods prices (Willig Exhibits 1B, 2B, 3B); I defer addressing these three exhibits until my discussion of pass-through in Section XIV. Of the seventeen remaining exhibits, all but two (Willig Report Exhibits 14 and 15) are related to price heterogeneity:

The terms "heterogeneity" or "dispersion" appear in the titles of Willig Report Exhibits 1A through 3B and 9. Willig Report Exhibits 4A through 5B are in support of his "different dynamics" evidence, in Exhibits 6 through 8, which show only that prices of CDTs and CPTs changed over time, at different rates, so their relative prices changed, as well. Willig Report Exhibits 10 through 13 show changes in relative prices calculated by Prof. Willig from his own, impaired version of my hedonic regressions.

¹⁶⁰ See my discussion of the flaws in Prof. Willig's evidence above at Section VI.

¹⁶¹ See Section VII.E.1.a).

¹⁶² See Section VII.E.1.c).

evidence of price heterogeneity merely shows that prices changed over time;¹⁶³ most of his evidence is therefore incapable of supporting the conclusion that a price structure did not exist.

The remaining two exhibits¹⁶⁴ presented by Prof. Willig to rebut my claims regarding a price structure are also inconsequential. He creates his own models that are impaired versions of my hedonic regressions by omitting significant variables,¹⁶⁵ then presents evidence that his regressions predict poorly.¹⁶⁶ It is of little interest that Prof. Willig is able to impair the performance of my models by omitting relevant variables; this evidence only appears meaningful because he calls *his* failed models “Dr. Netz’s hedonic regressions”. They are not; they are Prof. Willig’s failed regressions.

b) Prof. Willig exaggerates the degree of price variation

As I showed in Section VI above, there is far less product differentiation and far less heterogeneity in CRT prices than is portrayed by Prof. Willig. While it is true that CRTs are differentiated products, there is a limited number of major product designs; each Defendants’ top five product families account for most of its sales each year. (See Exhibit 14.) For the purpose of both price fixing and during the ordinary course of business, Defendants focus on a small number of product characteristics. Prof. Willig’s analysis of price heterogeneity is also deeply flawed, conflating changes in prices due to exchange rate fluctuations with changes in CRT prices, and he fails to account for the effect of quantities purchased on price. Perhaps most significant for evaluating whether the effect of the cartel’s price fixing was common across class members, his analysis of CRT prices makes no attempt to distinguish heterogeneity due to common factors, such as CRT size and shape, from heterogeneity due to individual factors.

c) Price heterogeneity is consistent with the existence of a price structure

Much of the price heterogeneity in the evidence presented by Prof. Willig is evidence that is consistent with the existence of a price structure. As described above, a price structure is a shorthand term to refer to relationships between heterogeneous prices. Prof. Willig appears to be examining a different price relationship, one where the price structure is constant over the entire damages period.¹⁶⁷ A price structure that changes over time is consistent with my conclusion that the cartel’s conduct caused all CRT prices to be supracompetitive, as I explain below in Section VII.E.2.c)(2).

¹⁶³ Willig Report Exhibits 2A and 3A show heterogeneous changes in price over time; see his discussion of his Exhibit 2A in ¶46 and his discussion of his Exhibit 3A in ¶¶49-51. Willig Report Exhibits 6-8 and their supporting exhibits, Willig Report Exhibits 4A, 4B, 5A, and 5B, and his Exhibits 10A, 11A, 12, and 13 are exclusively related to changes in relative prices over time.

¹⁶⁴ Recall that in footnote 159, I showed that all but two of the exhibits presented by Prof. Willig to rebut the existence of a price structure are purportedly evidence of heterogeneity. Here, I discuss the two exhibits that do not purport to be evidence of heterogeneity in prices, Willig Report Exhibits 14 and 15.

¹⁶⁵ Prof. Willig impairs my regressions by omitting buyer-seller dummies; he also estimates annual versions of my models. Willig Report, ¶75 and Exhibits 14 and 15.

¹⁶⁶ Willig Report, ¶¶78-79 and Exhibits 14 and 15.

¹⁶⁷ See footnote 152.

Price heterogeneity falls into two broad categories: differences in prices at a point in time and differences in prices over time. In the next sub-section, I explain that price differences at a point in time are actually part of the price structure. In the following sub-section, I show that differences in prices over time are consistent with the existence of a price structure.

(1) Price heterogeneity at a point in time

(a) Different prices for different CRTs

Some CRT models have higher prices than other CRT models; these price differentials are part of the heterogeneity in CRT prices Prof. Willig claims is inconsistent with the existence of a price structure. On the contrary, the existence of price differentials for differentiated CRT models is integral to the price structure. The hedonics regressions from my Original Report show that the variation in CRT target prices and actual prices is primarily explained by common product characteristics, such as CRT size and shape; in other words, that there is a relationship between CRT prices that is explained primarily by common product characteristics. That is the relationship that I refer to with the term price structure.

Prof. Willig includes price variation from all sources, including price variation explained by common factors, in his Exhibit 1A. This makes no sense if the goal is, as it is here, to evaluate whether impact is common; it shows only that some prices are high and some are low and is blind to common product characteristics that explain the differences in prices.¹⁶⁸

(b) Buyer-seller relationships

The existence of a price structure is also consistent with the existence of different prices to different customers. Among the characteristics of CRT prices that are the same in the actual and but-for worlds are price adjustments CRT manufacturers confer upon certain of their customers relative to other buyers. Buyers that received a relatively lower price than other buyers in the actual world, for example because they are very large buyers, would have received a relatively lower price than other buyers in the but-for world; both types of buyers would pay lower prices in the but-for world than they did in the actual world. Price variation that is explained by buyer-seller relationships is part of the price structure.

The hedonics regressions applied to Defendants' data in my first declaration show that, while most variation in price is explained by common CRT characteristics such as size and shape, some variation in price is explained by buyer-seller pairs. Variation in price that is explained by buyer-seller pairs is further evidence of the existence of a price structure.¹⁶⁹ Discounts given by a particular seller to a particular direct purchaser are common to all class members who purchase finished products made using the discounted CRTs.

¹⁶⁸ Prof. Willig cites his Exhibit 1A as evidence of “the substantial amount of dispersion in CRT prices that existed at any given point in time during the class period”, and acknowledges in his discussion of his Exhibit 1A that such heterogeneity exists “because CRTs are widely differentiated by features such as application (TVs or computer monitors), brand, size, shape, resolution, the inclusion or exclusion of deflection yokes, type of mask, electrical properties, and the extent and type of customization.” Willig Report, ¶15.

¹⁶⁹ Price heterogeneity that I show is due to buyer-seller relationships is part of the “substantial amount of dispersion in CRT prices” (Willig Report, ¶15) that Prof. Willig presents in his Exhibit 1A.

(2) Prices differences over time are consistent with the existence of a price structure

In this section, I show that evidence that prices change over time is consistent with the existence of a price structure, and with my conclusion that the cartel caused all CRT prices to be supracompetitive. First, I show that my conclusions do not rely in any way on price stability over time; prices that change over time therefore cannot be inconsistent with my conclusions. Second, I show that the price structure and my conclusion that impact was common naturally coexist with prices that change over time.

The price structure describes relationships among prices at a point in time, as I explained above.¹⁷⁰ And, as I showed above, the cartel has the incentive to cause all prices to be above the competitive level and market forces alone cause all prices to be above the competitive level when target prices are explicitly set for only a subset of CRTs. Both the incentive and the market mechanism discuss only prices as they exist at a point in time.¹⁷¹ Prices that change over time are immaterial to, and therefore consistent with, the existence of a price structure, and my conclusion that the cartel raised the entire price structure.

Changes in CRT prices over time are caused by changes in market conditions, such as changes in consumer demand for CRT products or changes in the cost of manufacturing CRTs. The but-for world differs from the actual world only in the absence of the challenged conduct. Therefore, the same changes in market conditions over time, and consequently the same changes in CRT prices over time, that occurred in the actual world would also have occurred in the but-for world. For example, if the cartel had not fixed prices and restricted output, CRT prices in the but-for world would have changed over time due to the emergence of flat panel displays, just as CRT prices changed in the actual world due to the emergence of flat panel displays. Any differential impact on prices of CDTs and CPTs in the actual world due to the emergence of flat panel displays would also have occurred in the but-for world. Because this differential impact in CDTs and CPTs would have occurred in both the actual and but-for worlds, it is part of the price structure.¹⁷² While these changes in market conditions caused CRT prices to change over time, all CRT prices were lower in the but-for world than in the actual world at each point in time, according to the logic underlying my conclusion that harm was common.¹⁷³ There is therefore no inconsistency between my conclusion of common impact based on evidence of the existence of a price structure and any evidence of changes in price over time, or of changes in relative prices over time, or “different dynamics” affecting different models of CRTs.

A great deal of Prof. Willig’s evidence purports to show changes in CRT prices and in relative CRT prices over time.¹⁷⁴ As I showed above, Prof. Willig’s evidence of changes in CRT prices actually shows volatility in exchange rates conflated with changes in CRT prices, and cannot be

¹⁷⁰ See Sections VII.E.1.a) and VII.E.1.b).

¹⁷¹ See Section VII.E.1.c).

¹⁷² The price structure includes the characteristics of CRT prices that are the result of circumstances that are the same in the actual and but-for worlds, at a point in time, as I explained above in Section VII.E.1.a).

¹⁷³ See Section VII.E.1.c).

¹⁷⁴ In footnote 163 I show that most of the evidence presented by Prof. Willig regarding the existence of a price structure is related exclusively to changes in prices over time.

relied upon as evidence of the extent to which CRT prices changed over time.¹⁷⁵ Prof. Willig offers no clear explanation of why he believes the evidence he presents is inconsistent with the existence of a price structure, he simply asserts that it is.¹⁷⁶ As I have just shown, changes in prices and changes in relative prices are consistent with the existence of a price structure.

3. The price-fixing process accommodated changes in relative prices over time

Prof. Willig presents additional evidence that he claims contradicts the existence of a price structure. In Exhibits 6, 7 and 8, Prof. Willig calculates price indices for different aggregations of CRTs that he says demonstrate the aggregate prices failed to move together over time. In Exhibits 10 and 11, Prof. Willig presents his regression analyses that he claims also demonstrate prices of different products failed to move together over time. From the failure of prices to move in lockstep over time, he concludes that there is not a price structure of the type he says I require for my argument.

As I explained above, I do not have the opinion that there was a rigid price structure within which all CRT prices moved in lockstep with each other over time, nor is such a view relevant to any opinion I have offered. I claim there is a small set of product attributes that determine the vast majority of product price variation and that the cartel instituted a system of target prices keyed on these major product attributes. By setting their various target prices, the cartel controlled prices across the full range of CRTs at issue.

The three price indices Prof. Willig offers as evidence contradicting my price structure argument do not, in fact, contradict my opinions. Rather, they help demonstrate what is relevant in the price structure. Prof. Willig says Exhibit 6 shows that the prices of CDT and CPT move differently over time. But, as was clear from my report, the cartel had distinct control mechanisms – different meetings, different prices – for CDTs and CPTs. The cartel was entirely capable of responding to different economic environments across the two products.

Prof. Willig offers Exhibits 7 and 8 as evidence that relative CPT prices varied over time across different sizes and shapes, respectively. Again, there is nothing in my view of the workings of the market or the cartel that is contradicted by this evidence.¹⁷⁷ As was documented in my initial report, the cartel adjusted target prices by size and shape and there is nothing to suggest they kept relative prices the same over time. For example, a quick examination of Exhibit 28 [21" CPT price ranges exhibit responding to Willig 19] shows the price range for 21" CPTs became narrower in later years. The price ranges for 21" CPTs are driven by the difference between flat and round prices; the narrowing of the range reflects a decline in the premium for flat tubes in

¹⁷⁵ See above at Section VI.B.

¹⁷⁶ Willig Report, ¶14.

¹⁷⁷ Prof. Willig appears to put a great deal of importance on the fact that I used a regression model in my hedonic analysis that assumed stable price relationships over time across different sizes. That specification was a convenience to simplify the model and its interpretation and to maximize the similarity between the models used for transaction data and target price data. The target price data are too few to allow year-by-year analyses. As a robustness test, I reran my hedonics on actual price data using interaction terms between size and year to allow the relative prices of sizes to vary over time. It made a minor improvement in my ability to explain product prices based on date, size, aspect ratio, and finish.

the target prices: the cartel is adjusting the relative prices of flat and round tubes over time. For the range to become smaller, it is necessarily the case that flat prices must decline faster than round prices, which is what is shown in Prof. Willig's Exhibit 8. Thus, again, while Prof. Willig's analysis might contradict his caricature of my opinions, the data support my actual opinions.

The same is true for Prof. Willig's Exhibits 10 and 11. Both show changes in relative prices over time of different sizes of CDT (Exhibit 10) and CPT (Exhibit 11). As with his price indices, this in no way contradicts my analysis because the cartel's price fixing process was heavily focused on price and completely capable of adjusting relative target prices over time.

4. Prices of CRTs are primarily determined by common factors

In my original report, I used regression analysis to assess whether or not CRT prices were primarily determined by common factors. By definition, regression analysis divides the variation in a variable into two parts: that which is explained by the regression model (the "explained variation") and that which is not (the "residual variation"). The R^2 statistic, which is the standard measure of how well a model fits the data, reports the ratio of explained variation to total variation in the dependent variable. The R^2 from a regression analysis of CRT prices using a model which includes only common factors therefore yields a precise measure of the minimum extent to which CRT prices are determined by common factors.

As previously stated, I found that a regression of CRT prices on a few explanatory variables resulted in an R^2 of about 0.92 for CPTs and 0.96 for CDTs. I included three types of variables in these models:¹⁷⁸ product characteristics, a simple time trend, and indicator variables for buyer-seller pairs.¹⁷⁹ Since these variables are all common factors, the results of my hedonic analysis indicated that at least 91.9% and 96.4% of the variation in CDT and CPT prices, respectively, were explained by common factors.

On the other hand, the residual variation from my hedonic analysis indicates at most how much variation in CRT prices can be explained by factors that were not included in the regression model. In this case, at most 8.1% and 3.6% of the variation in CDT and CPT prices, respectively, were explained by factors not included in the analysis. The omitted factors include those related to individual direct purchasers and common factors. Many common factors played a role in pricing but could not be included in my model because the data were insufficient. For example, the curvature (shape) of a CRT was a major determinant of CRT prices, but could not be included in the regression model because an insufficient share of the Defendants' sales data recorded this characteristic. Other factors not directly captured in the model include various CRT characteristics, such as frequency or mask type, and exchange rate noise. I am able to conclude

¹⁷⁸ Regression analysis that examines the impact of product characteristics on prices are referred to as hedonic regressions in the economic literature.

¹⁷⁹ Buyer-seller indicator variables explain a relatively small but significant share of the variation in CRT prices. The interpretation of the coefficients on these variables is not straight-forward, as they capture both the effect of bilateral negotiations and unobserved product characteristics on price. There is no reason to believe that the effect of omitted product characteristics on the price of CRTs was individualized or in any way related to the conduct of the Defendants. Similarly, the impact of bilateral negotiations on price would have been the same in the but-for and actual worlds (see Section VII.E.1.a)).

that there is a strong likelihood that these common factors account for a share of the residual variation in prices on the basis of strong documentary evidence and supplementary analyses.

Prof. Willig has criticized the analysis supporting my conclusion that prices were primarily determined by common factors. First, he claims that I have incorrectly restricted the premium for different sizes of CRTs to be the same for all years and manufacturers. Second, he claims that the residual variation in CRT prices is material, and is potentially explained by negotiations between CRT manufacturers and customers or unobserved product characteristics. Both points simply raise the possibility that common factors which were not included in my hedonics model may explain a portion of the residual variation in CRT prices. As such, these criticisms do not contradict my conclusion that common factors predominated in the determination of CRT prices.

Prof. Willig criticized my model for restricting the effect of product characteristics on price to be same for all years.¹⁸⁰ I have already explained that changes in relative prices over time are consistent with my conclusions regarding the existence of a price structure (see Section VII.E.2.c)(2)) and that I imposed the restriction to simplify the model and comparisons between my hedonics on target and actual prices (see footnote 177). To assess the impact of Prof. Willig's criticism on my hedonic analysis, I estimated an alternate version of my hedonics model which included interaction terms between size and year using the actual price data. By doing so, I allow for the size of a CRT to affect the CRT's price differently in different years. This alteration slightly increased the explanatory power of the model, reinforcing my conclusion that CRT prices are primarily determined by common factors.

In addition, Prof. Willig claims that the relative price for CRTs of different sizes varied across manufacturers in different years.¹⁸¹ The methodology underlying Prof. Willig's conclusion is flawed. The price premiums for Philips reported in Exhibit 12 and cited in Prof. Willig's report are, at first glance, incredible – Philips was purportedly selling 15" CDTs at 5% premium over 14" CDTs and 17" CDTs at a 187% premium over 15" CDTs. However, a basic inspection of the data reveals that these figures are driven by a series of implausible transactions.¹⁸² Because Prof. Willig includes these implausible transactions, he erroneously understates the price for 15" CDTs. Thus, the erroneous 15" price is closer to the 14" price and farther from the 17", understating and overstating, respectively, the price premia. Another error in Prof. Willig's analysis is his failure to account for changing product mix. Differences in the relative prices for CRTs of different sizes across manufacturers reflect differences in the types of CRTs sold by different manufacturers at each size.¹⁸³

¹⁸⁰ Willig Report, ¶75 and Exhibits 10-11.

¹⁸¹ Willig Report, ¶76 and Exhibits 12-13.

¹⁸² These results are driven by a series of transactions in which Philips sold monitors apparently rejected by one customer (B.U. Monitors) to a second customer (Video Display Inc., VDI) at prices of \$5 or \$10 each. I reach this conclusion because the very low price sales to VDI in the Philips data have offsetting, negative, quantities from B.U. Monitors. The B.U. Monitor transactions often indicate "RA-nnnn" numbers, presumably "Return Authorization" while the offsetting VDI transactions have matching "RMA-nnnn" numbers. Additionally, a number of the VDI transactions specify "Ship from B.U. Monitors to [VDI]".

¹⁸³ For example, Panasonic moved into flat 21" CPT early and strongly; it made little move into flat 29" CPT. On the other hand, Samsung moved into 29" flat CPT early, then pulled back from them, and had a somewhat later and lighter move to 21" flat CPT. Recall that, all else equal, a flat CRT is more expensive than a round CRT. Therefore,

Prof. Willig has also argued that a high R^2 is consistent with the possibility that individual factors played an important role in determining prices.¹⁸⁴ To support this conclusion, he presents Exhibit 14 and 15, which show that the difference between the actual price and the price predicted by a modified version of my model is greater than 5% for a majority of observations. This is a spurious criticism. The question at issue is whether common or individualized factors predominate in the determination of CRT prices. In other words, I have assessed the relative significance of possible determinants of CRT prices. Prof. Willig incorrectly focuses on whether or not a factor had any significance whatsoever.

This analysis suffers from several methodological flaws. First, Prof. Willig calculates the share of observations for which the predicted price is within 5% of the actual price rather than the share of quantity sold. Prof. Willig treats each price equally, regardless of whether the price represents a sale of ten CRTs or ten thousand CRTs. This gives disproportionate weight to small transactions, which are the most likely to be abnormal and therefore deviate more significantly from the predicted price. I addressed the fundamental error of attempting to assess issues of commonality without considering quantities in Section VI.A.1. Second, Prof. Willig has provided weak justification for his 5% threshold and presented no evidence to demonstrate that his analysis is robust to the choice of threshold. Finally, Prof. Willig conducts his analysis using an altered version of my model which omits buyer-seller indicator variables. In doing so, he uses the results of a regression analysis using one model (his) to assess the explanatory power of another (mine); this is a meaningless comparison.

These methodological flaws bias Prof. Willig's results and reflect the general lack of rigor in his analyses. Consider Exhibits 31 and 32. In these exhibits, I reproduced the results in Exhibits 14 and 15 from Prof. Willig's report. I then calculated the share of quantity sold for which the actual price deviated from the price predicted by my original regression model by more than five, ten, fifteen, and twenty percent. Two results are illustrated in this analysis. First, Prof. Willig's methodology yields results which are biased towards the conclusion that the residual variation in CRT prices was material. Second, the results of the analysis are extremely sensitive to his choice of a 5% threshold.

Prof. Willig's criticisms of my hedonic analysis are either immaterial, derived from faulty analysis, or both. None of his criticisms contradicts my conclusion that CRT prices are primarily determined by common factors.

5. I continue to conclude the cartel raised the prices of all CRTs at issue over the damages period

My original analysis went further than showing that actual prices were primarily determined by a few product characteristics. I also showed that the variation in target prices was determined by a small set of product characteristics.¹⁸⁵ Moreover, the primary factors determining target prices

the different product mixes leads to a relatively high 21" price for Panasonic and a relatively low 29" price for Panasonic relative to Samsung, as reflected in Prof. Willig Report Exhibit 13.

¹⁸⁴ Willig Report, ¶¶78-79 and Exhibits 14-15.

¹⁸⁵ 98% of target CPT prices and 91% of target CDT prices are determined by common factors. Original Report, p. 69, Exhibits 19 and 20.

were the same as those determining market prices.¹⁸⁶ The symmetry between the major factors explaining market prices and target prices was a key part of my conclusion that the cartel had common impact across all CRTs: the different “controls” available to the price setters were very well matched to directly target the attributes that are most important in determining price.

Based on my analysis and my assessment of Prof. Willig’s evidence, I find that:

- CRT product sales are concentrated in a limited number of product archetypes.
- My hedonic regression analysis on Defendants’ sales data and the August 2001 histograms (Exhibits 2-4, 6-7, 10, and 12-13) show that a limited range of product attributes explain price differences.
- Defendants’ day-to-day business documents consider the same small number of product attributes.
- My hedonic regression analysis on the target price data reveals the price fixers focused on the same set of product attributes for setting prices.

I conclude there are relatively few important products in terms of the products actually bought by consumers and the cartel set prices based on exactly those attributes that underlie most of the price differentiation in the industry. There is no vast morass of inexplicable prices for an incredible range of products – rather, a limited range of archetypes are sold at prices the cartel controlled by focusing on the key product attributes.

6. Prof. Willig’s inconsequential conclusions

When Prof. Willig’s conclusions regarding the existence of a price structure are carefully parsed, they are largely inconsequential. They may sound meaningful because they capitalize on the potential for confusion of two different things: changes in price over time and increases in the actual price relative to the but-for price; the latter is evidence of successfully exercised market power.¹⁸⁷ For example, Prof. Willig draws the inconsequential conclusion that “knowing prices of a subset of CRTs or CRT finished products *increased* during a certain period would not be a basis reliably to infer that prices of all (or most) other CRTs or CRT finished products also *increased*.”¹⁸⁸ This may sound like a negation of my claim that “all CRT prices are caused to be *supra-competitive* when the cartel sets a subset of prices *above the competitive level*”,¹⁸⁹ but upon scrutiny, Prof. Willig’s conclusion amounts to nothing more than an observation that some CRT prices went up and some went down. This is not a statement about the question of impact (common or not); what is relevant for common impact is whether observing the exercise of monopoly power on a subset of CRTs is evidence that the prices of related products are also *above competitive* levels, at a particular point in time. Prof. Willig’s conclusion only *sounds* like

¹⁸⁶ I controlled for shape in the target price regression. I controlled for shape in the Defendants’ data actual price regression only for Panasonic and Samsung; the other Defendants’ data do not record shape. Similarly I control for customer effects differently for target prices and actual prices given differences in the data sets.

¹⁸⁷ See the discussion in Section III.

¹⁸⁸ Willig Report, ¶48, emphasis added.

¹⁸⁹ Original Report, p. 33, emphasis added.

his evidence is inconsistent with the existence of a price structure. Both his evidence and his conclusion are entirely consistent with the existence of a price structure.

Other conclusions in Prof. Willig's testimony that similarly sound like statements about the existence of the price structure turn out to be, upon closer inspection, inconsequential statements about changes in prices over time. For example, he proposes to test for "a cartel-induced elevation" in price by examining whether relative prices changed "over time".¹⁹⁰ This creates the false impression that Prof. Willig has presented evidence inconsistent with the existence of a price structure. He has not. The same conflation of changes in prices over time with "raising price" by the exercise of monopoly power underlies Prof. Willig's Exhibits 10A, 11A, 12, and 13. Like all of Prof. Willig's other evidence, the evidence in these exhibits is entirely consistent with the existence of a price structure.

F. The cartel caused higher prices in North America

In my initial report, I concluded that class members, who are North American consumers, were impacted by (faced higher prices due to) the cartel's actions.¹⁹¹ That conclusion was based on my understanding of the global nature of the CRT industry and the extensive, global, interconnectedness of the trade in CRTs and CRT finished goods. Prof. Willig's claims and analyses have not changed my opinions – the collusion revealed in the meeting notes had global impact.

In their motion opposing class certification, the Defendants assert that some tubes were geographically restricted. Strictly speaking, there are no CRTs that "could only be sold in North America".¹⁹² There are three aspects of a CRT that affect its marketability across geographic areas: ITC adjustment, shielding, and broadcast standards. As I described in my original report, the deflection yoke on a CRT aims the beam, sweeping it back and forth and up and down.¹⁹³ As part of the mounting and alignment process, the deflection yoke is adjusted to account for the effects of Earth's magnetic field on the electron beam. Because the Earth's magnetic field in the Southern Hemisphere is opposite the field in the Northern Hemisphere, ITC CRTs are hemisphere specific: an ITC CRT pinned for the Northern Hemisphere won't give good picture quality in the Southern Hemisphere and vice versa.¹⁹⁴ Shielding – the magnetic protection inside the tube that helps to isolate the electron beam from outside magnetic influences – might also be related to the geographic location of the end user. Some tubes that were expected to be used near the equator had "strong" shielding.¹⁹⁵ These issues are relevant for both CDT and CPT, but, again, impose very broad (hemisphere wide) geographic limitations on tube marketability.

CPTs have a further geographic limitation. Different areas of the world used different broadcast standards that were incompatible. North America, Japan, Taiwan, Philippines and some other

¹⁹⁰ Willig Report, ¶74.

¹⁹¹ Original Report, p. 89.

¹⁹² Memo in Opp., p. 7:9-10.

¹⁹³ Original Report, p. 16.

¹⁹⁴ 17 July 2012, Deposition of Hitachi Displays, Ltd. 30(b)(6) Witness Nobuhiko Kobayashi, Volume I (Hereinafter "Hitachi 30(b)(6) Nobuhiko Kobayashi Volume I Deposition, 17 July 2012"), pp. 49:17 - 51:8.

¹⁹⁵ Hitachi 30(b)(6) Nobuhiko Kobayashi Volume I Deposition, 17 July 2012, pp. 36:12 – 37:23.

Northern Hemisphere countries used the NTSC standard.¹⁹⁶ Most of Europe used the PAL standard. Other countries used the SECAM standard. The most relevant difference for present purposes is that the standards have different numbers of horizontal and vertical lines of resolution. A tube manufactured for NTSC won't work with a PAL broadcast and vice versa. While the need for broadcast standard compatibility constrains the geographic marketability of CPTs, it does not constrain any to strictly North America.¹⁹⁷

Despite the fact that tubes could be used across geographic regions, it is also apparent that tube manufacturers and their customers at times discussed the specific marketing region for a given tube order from the finished goods manufacturer. For example, Samsung SDI quoted a price to Philips' finished goods business in "China/[Asia Pacific]" for 300,000 21" round CPT for "NAFTA export business support".¹⁹⁸ Similarly, notes from a meeting between MTPD and Philips finished goods business describe Philips' Suzhou (China) plant expecting to increase its output from less than 1 million to 1.5 million units "due to higher export qty (NAFTA)".¹⁹⁹

In addition to awareness of specific orders being destined for America, cartel members had a general awareness that their CRTs produced in NAFTA as well as Asia were destined for American consumers:

"With regard to the order of this year's worldwide production and sales, it is normal in most regions, except America: The American side was overly optimistic about the market. It is estimated that this year, there are NAFTA: 25M, China: 4.5M, South East Asia: over 14M, sold to America; Total about 44M."²⁰⁰

Prof. Willig claims that the cartel may not have harmed *all* end-consumers in the U.S., even if it was effective elsewhere:

"If, in fact, the alleged cartel typically set target prices with no reference to the U.S. or North America, and if U.S./North American CRT prices and market conditions were materially different from the rest of the world, then members of the IPP class that purchased finished products made using CRTs manufactured in the U.S. or North America potentially may have been unharmed even if the alleged cartel successfully elevated prices of CRTs in the rest of the world."²⁰¹

Prof. Willig points to the earlier and faster encroachment of flat panel displays in the North American market for monitors and TVs as evidence of unique conditions in the U.S.²⁰² In

¹⁹⁶ CountryCode.org, Undated, World Television Signal Guide, <http://countrycode.org/tv-standards>, accessed 13 February 2013.

¹⁹⁷ For example, CPTs for the Japanese market were the same as for the United States. 16 July 2012, Deposition of Panasonic Corporation, Panasonic North America and MTPD 30(b)(6) Witness Tatsuo Tobinaga (Hereinafter "Panasonic 30(b)(6) Tatsuo Tobinaga Deposition, 16 July 2012"), pp. 56:11 - 56:19.

¹⁹⁸ Philips, Samsung SDI, 20 November 2002, Business Discussion, SDCRT-0006442 - SDCRT-0006452 at 6446.

¹⁹⁹ Panasonic, 14 October 2002, Customer Visit Report, BMCC-CRT000271099 - BMCC-CRT000271102 at 1100.

²⁰⁰ This document reflects notes from a meeting of Chunghwa, LPD, and Samsung SDI. Chunghwa Picture Tubes and LTD, 12 December 2002, CPT Market Report, CHU00125162 - CHU00125167 at 5162.01E.

²⁰¹ Willig Report, ¶65, emphasis added.

²⁰² Willig Report, ¶18 and Exhibits 4A, 4B, 5A, 5B.

addition, he uses Defendants' sales data to claim that North American CPT prices behaved differently than CPT prices in the rest of the world.²⁰³ Prof. Willig's evidence and analyses of geographic issues are unpersuasive because they are either based on an inaccurate impression of the global trade in CRTs and CRT finished goods or they rely on fundamentally flawed analysis.

Firstly, he makes broad assertions about "diverse CRT price dynamics across geographic regions" while only examining CPT prices to support this argument.²⁰⁴ Indeed, Prof. Willig admits that CRTs arrived in the U.S. mainly in the form of monitors from Asia.²⁰⁵ There is no argument to be made about differential geographic impact for this important CRT category.

Even if I assume Prof. Willig's assertion quoted above is directed solely at CPTs, the evidence on which he bases his conclusion *cannot* support it. I first address his analysis of different pricing in North America compared to the rest of the world, then I address his evidence regarding different market conditions in North America compared to the rest of the world.

Prof. Willig's claim above is about tubes *manufactured* in North America. On the other hand, his Exhibit 9, his purported evidence that there are different prices in North America, examines tubes *sold to* North America, regardless of where they were manufactured. In addition to this conceptual error, Exhibit 9 is rendered completely unreliable by Prof. Willig's failure to consider the impact of exchange rate volatility on his analysis. As I showed in Section VI.B, Prof. Willig's Exhibit 9, in which he compares the price dynamics of U.S. and foreign CPTs and finds a weak relationship, is fundamentally flawed. He builds his analysis using U.S. dollar conversions, meaning that the measures of month-to-month change capture exchange rate fluctuations as well as the underlying transaction price variation. I find that foreign exchange effects explain much of the month-to-month price changes in foreign CPTs. See Exhibits 20 to 22. Controlling for these can affect both the magnitude and sign of the price changes, invalidating Prof. Willig's conclusions in Exhibit 9. The results presented in Exhibit 9 are not related to actual movements in CRT transactions prices in a reliable manner due to the overpowering influence of foreign exchange rate movements. Prof. Willig has no factual basis for his claim that North American prices were systematically different from the rest of the world.

The evidence underlying Prof. Willig's claim that "[m]arket conditions for CPTs in North America were indeed different from those in the rest of the world" is also flawed.²⁰⁶ Prof. Willig's evidence, presented in his Exhibits 4 and 5, examines monitor and television markets, *not* CRT markets. Therefore the evidence in Exhibits 4 and 5 are relevant for investigating purported differences across geographic areas only if one *assumes* a direct link between where CRTs are purchased (where finished goods manufacturers are) and where finished goods are consumed. Assuming a direct link between regional finished product demand and regional CRT demand misrepresents the relationship between the manufacturing location of a CPT and the end-consumption location of a CPT. CPTs sold to local TV makers could, and often did, end up elsewhere in the world as part of a finished product. CRT TVs, particularly the small and medium sizes, were imported and exported in a global market.

²⁰³ Willig Report Exhibit 9.

²⁰⁴ Willig Report, ¶¶18 and 64.

²⁰⁵ Willig Report, ¶67.

²⁰⁶ Willig Report, ¶66.

Internal market analyses from the Defendants show substantial TV imports into the U.S. from non-NAFTA sources during the class period,²⁰⁷ especially after 2000, which is the period Prof. Willig examines in his Exhibits 4 and 5. According to Prof. Willig, this is when North American pricing dynamics were the most different from the rest of the world (because of rapid flat panel encroachment). However, these years also saw a significant increase in the number of TVs imported to the U.S. As of 2003, over 60% of TVs consumed in North America were imports.²⁰⁸ Even large televisions faced competition from imports during this time.²⁰⁹

²⁰⁷ See, e.g.,

- 1993 – 1997: Total NAFTA production, imports, and sales of TVs by size. Shows that NAFTA relied heavily on imports for small sizes. 28 August 2000, Philips Display Components North America: 1998 - 2002 Strategy Review, FOX00007278 at 93.
- 1998 – 2002: TV imports to US by source country and size segment. Shows imports from non-NAFTA countries increasing as share of each size segment. Toshiba Display Devices, March 2003, Chinese CTV Impact for US CTV Market, MTPD-0576311 at 3-9.
- 2000 – 3Q 2003: TV imports to US by source country and size segment. Shows imports from non-NAFTA countries increasing as share of each size segment. December 2003, North American TV and CRT Market Condition Report for 2003, MTPD-0083663 at 33-37.
- 2002: 24.1m TV produced in NAFTA, 16.1m imported, 2m exported. 19.4m CPT produced in NAFTA, 5.2m imported, 0.6m exported. Wood, Steve, 29 April 2003, Report to ECA Electronic Display & Tube Division Committee, HEDUS-CRT00183949 - HEDUS-CRT00184017 at 3982.
- 2003: 20m TV produced in NAFTA, 20m imported, 7m exported. 15.8m CPT produced in NAFTA, 5m imported, 0.7m exported. MTPDA (OH), 2003, MTPDA(OH) Key Operational Issues, MTPD-0164693 at 11.
- 2003 – 3Q 2004: TV imports to US by source country and size segment. Shows substantial imports from non-NAFTA countries. O'Brien, Bob, Skelly, Bob, 29 November 2004, Oct-2004 Market Report Americas, HEDUS-CRT00156572 at 16-20.
- 2003 – 2008: Series of charts show imbalance in NAFTA TV production and consumption for small, medium, large and very large TVs (implying import of tubes in TVs for remainder). Matsushita Toshiba Picture Display Co., Ltd., December 2004, Technical Meeting with Philips, MTPD-0516759 at 8-12

²⁰⁸ MTPDA (OH), 2003, MTPDA(OH) Key Operational Issues, MTPD-0164693 at 11.

²⁰⁹ See, e.g.,

- “NAFTA : CTV imports into NAFTA from AP-China have surged from a level of 13M in 01 to 20M in 03 resulting in a serious drop in local CTV production. We expect that the local CTV production has lost it's [sic] competitiveness not only in S-M but also in the Large segment and will continue to decline in the future.” 05 March 2003, SR03 Market Update & Analysis, PHLP-CRT-006753 at 2.
- “[Bullet] Even as NAFTA TV sales grew in 2002, NAFTA domestic TV production and CRT sales declined. [Sub-bullet] More of TV sales demand being satisfied by imported TVs [Sub-bullet] Imported TVs effecting [sic] mid-large TV production the most [Sub-bullet] Mid-VLS [Very large size] CRT sales down 7% or nearly 1.4M due to fewer Mid and 25V CRT sales. [Bullet] Trend: Less NAFTA CRTs in TVs sold in NAFTA.” Wood, Steve, 29 April 2003, Report to ECA Electronic Display & Tube Division Committee, HEDUS-CRT00183949 - HEDUS-CRT00184017 at 3960, emphasis added.

With TVs – and CPTs to a lesser extent²¹⁰ – streaming into North America from around the world, Prof. Willig’s claims of “diverse price dynamics” seem dubious. NAFTA TVs were competing with foreign TVs, and NAFTA CPTs were competing with foreign CPTs, making it highly unlikely that North American CPT manufacturers could have set prices independently of global market forces. Thus, they would have been susceptible to the influences of the cartel.

The Defendants’ data support this conclusion. Upon comparing cartel target prices to the actual transaction prices of CPTs sold in North America, I find a larger share of CPT sales prices in North America are within 5% of the cartel target prices set for comparable products than I found for CPTs generally. The results are presented in Exhibit 26. This price comparison includes observations from all size segments of CPTs (small, medium, large, and very large). If I compare the prices of CPTs manufactured in North America to target prices, I find that they are shifted above target prices rather than below them (Exhibit 27). If Prof. Willig’s hypothesis, that customers buying finished goods containing CPT manufactured in America somehow avoided harm from the cartel, were true, then we would find prices of those CPTs lower than target prices.

Prof. Willig cites testimony regarding regional pricing authority to support his claim of differential prices in North America,²¹¹ but fails to place the testimony in proper context. The witness, Jaein Lee of Samsung, testifies that the regional offices could make local pricing decisions *as long as they met profit and loss goals set by global headquarters*.²¹² Headquarters calculated these figures using quarterly prices, which in turn guided the regional salespeople in their negotiations with customers.²¹³ When customers demanded a price that deviated from that quarterly price by a certain amount (e.g., 5 percent), the regional offices would have to involve global headquarters. Mr. Lee said even a 5% discount from the quarterly prices would be “too excessive” and require headquarter’s approval.²¹⁴ Prof. Willig refers to 5% discounts as “unusually large price changes”,²¹⁵ reinforcing my own assertion that CRT prices were generally not volatile (see Section VI.B).

The cartel meeting notes show an awareness of the global interconnectedness of the CPT market. One meeting note document, predating the post-2000 surge in imported TVs in North America, discusses small and medium CPTs and states, “Price-up trend in European & American market thanks to capacity reduction in Asia”.²¹⁶

²¹⁰ As of 2003, 25% of TVs made in North America used imported tubes. MTPDA (OH), 2003, MTPDA(OH) Key Operational Issues, MTPD-0164693 at 11.

²¹¹ Willig Report, ¶67 and footnote 55

²¹² 07 June 2012, Deposition of Samsung SDI 30(b)(6) Witness Jaein Lee, Volume II (Hereinafter “Samsung SDI 30(b)(6) Jaein Lee Volume II Deposition, 07 June 2012”), pp. 186:10 – 186:17.

²¹³ Samsung SDI 30(b)(6) Jaein Lee Volume II Deposition, 07 June 2012, pp. 186 and 189.

²¹⁴ Samsung SDI 30(b)(6) Jaein Lee Volume II Deposition, 07 June 2012, 07 June 2012, pp. 188:24 - 189:8.

²¹⁵ Willig Report, footnote 55.

²¹⁶ Chunghwa Picture Tubes and LTD, 27 October 1999, Visitation Report, Topic: Exchange of Market Information and Price Review, CHU00030899 - CHU00030903 at 0902E.

G. It is not necessary to estimate a but-for price to determine whether the cartel had common impact

Prof. Willig claims that because I did not estimate but-for CRT prices, “there is no basis in [my] report from which to conclude which CRT prices – if any – were above the competitive level.”²¹⁷ Prof. Willig’s logic is invalid. Whether CRT prices were above but-for prices is a question about relative prices, not price levels per se, and as such the answer to this question does not require a measurement of but-for prices. Just as determining whether one car is going faster, slower, or the same speed as another car does not require knowing either car’s speed, determining whether CRT prices were above the but-for prices does not require estimating the but-for prices.

I have evaluated the record evidence regarding the characteristics of CRT products and the CRT industry, meeting notes, Defendants’ sales data, deposition testimony, and documentary evidence. Based on these analyses of the record evidence and standard economic principles, I concluded that CRT prices were more likely than not to have been above but-for prices.

H. Conclusion: The cartel had a common impact on direct purchasers in the form of higher prices

Upon consideration of Prof. Willig’s analyses regarding common impact, my conclusion remains that the effect of the cartel’s challenged conduct was to cause prices paid by all direct purchasers to be supracompetitive.

Prof. Willig does not dispute the evidence I have presented that shows that the cartel had the power to set prices;²¹⁸ he does not dispute that the cartel had the incentive to cause all prices to be supracompetitive;²¹⁹ nor does he address the mechanism by which I showed that market forces alone can cause all prices to be supracompetitive when the cartel fixes a subset of prices.²²⁰ He says that a price structure of the sort I claim is “implausible,”²²¹ but he apparently misunderstands what I mean by price structure: he says (without explanation) that a price structure is “inconsistent” with heterogeneity in prices;²²² it is not.²²³ He presents evidence of two types of heterogeneity: he shows that prices and relative prices changed over time, and that price differentials exist at a point in time (across models of CRT, across manufacturers, and across regions). Since most of Prof. Willig’s evidence is directly about or in support of his argument that prices and relative prices change over time,²²⁴ and such evidence is entirely consistent with the existence of a price structure, most of his evidence is uninformative of whether the impact of the cartel’s price fixing was common. Even if evidence that prices

²¹⁷ Willig Report, p. 68, ¶145.

²¹⁸ Original Report, Section VIII.A.1.

²¹⁹ Original Report, Section VIII.B.1.a).

²²⁰ Original Report, Section VIII.B.1.b).

²²¹ Willig Report, ¶21.

²²² Willig Report, ¶14 and Willig Dep., p. 126:13-23.

²²³ Section VII.E.1.a) above.

²²⁴ Footnote 159.

changed over time were relevant, Prof. Willig's data are so poorly constructed that his evidence cannot be relied upon for the conclusions he draws.²²⁵

The remaining evidence of heterogeneity presented by Prof. Willig, price differentials at a point in time, is almost all explained by common factors, such as product characteristics and buyer-seller relationships, as my hedonics regressions show.²²⁶ Prof. Willig presents two criticisms of my hedonics regressions. First, he claims that they "mask" changes in relative prices over time;²²⁷ this criticism is premised on his misunderstanding that such changes over time are inconsistent with the existence of a price structure, so it is immaterial to common impact. His second criticism is that "my" hedonics regressions do not accurately predict prices, but it is his own version of my regression, which he impaired by removing variables, that he analyzes.²²⁸ My hedonics regressions predict prices better than the model he attributes to me.²²⁹ Because Prof. Willig analyzes his own impaired version of my hedonics regressions, my conclusion that my regressions show that most variation in CRT prices at a point in time is due to common factors is unrebutted on the record.

Prof. Willig's analysis of the effectiveness of the cartel based on industry characteristics and economic theory demonstrates nothing, because the economics literature shows that effective cartelization is consistent with a wide variety of industry characteristics, including the two characteristics Prof. Willig identifies.²³⁰ Prof. Willig gives a one-sided account of the literature,²³¹ failing to mention that the literature shows that effective cartels have operated in industries with a wide variety of characteristics, that vertical integration can facilitate collusion, that successful cartels have included vertically-integrated members, that shifting market shares have been observed in effective cartels, and that cartels can implement organizational solutions to challenges like opaque pricing.²³² The CRT cartel implemented operating practices that addressed the challenges it faced, such as frequent meetings, sharing of information, allocation of customers to suppliers, and monitoring.²³³ Ultimately, however, the economics literature shows that whether a cartel has been effective is an empirical question that cannot be answered by theory or industry characteristics.²³⁴

Prof. Willig's empirical analyses of cartel effectiveness are so deeply flawed, both conceptually and in their implementation, that they cannot be relied upon as evidence of the effectiveness of the cartel. His regression of actual price changes on target price changes uses data that conflate

²²⁵ Section VI.B.

²²⁶ Original Report, Section VIII.B.1.e) and Section VII.E.4.

²²⁷ Willig Report, ¶69.

²²⁸ Willig Report, ¶79, footnote 65, and Exhibits 14A and 15A; see also Section VII.E.4 above.

²²⁹ Exhibits 31 and 32.

²³⁰ Sections VII.B.2, VII.B.3 above, and Original Report, Section V.B.2.c).

²³¹ Willig Report ¶¶81-87.

²³² Original Report, Section V.B.2, V.B.3, VIII.A.2, and Sections VII.B.2, VII.B.3, VII.C above.

²³³ Original Report, Section VIII.A.2, and Section VII.C above.

²³⁴ Original Report, Section V.B.2.c).

changes in exchange rates with changes in CRT prices, and conflates changes in price over time with differences in price across models.²³⁵ His regression fails to control for all influences on CRT prices except changes in target prices, thereby attributing (in error) all changes in actual prices, including the downward pressure on CRT prices due to competition from LCD panels, to changes in target prices.²³⁶ His price-matching analysis cannot show that the cartel was ineffective, because even if actual prices were generally below target levels, it would not show that actual prices were at competitive levels.²³⁷ His price matching study was poorly implemented, and when I corrected its flaws, it showed, as my price matching study does, that actual CRT prices charged by cartel members were broadly consistent with the cartel's target prices.²³⁸

Much of the evidence of cartel effectiveness I have presented Prof. Willig simply ignores. He fails to address the evidence I presented that the cartel had market power.²³⁹ He agrees that restricting output causes prices to be supracompetitive,²⁴⁰ and he does not dispute the evidence that the cartel restricted output, but he does not account for this evidence in his analysis of the effectiveness of the cartel. He does not consider the evidence I have presented that the cartel proclaimed its own success.²⁴¹ The CRT cartel operated for over twelve years, a greater length of time than 90% of cartels whose duration was analyzed in a recent meta-study of cartel studies,²⁴² Prof. Willig offers no explanation for the Defendants continuing to incur the risk of prosecution and expense of operating an illegal cartel for so long if it did not cause prices to be above competitive levels.

VIII. The cartel had a common impact on indirect purchasers

A. Overview of the issues

1. Summary of my conclusions

After reviewing Prof. Willig's report, my conclusions regarding impact on indirect purchaser class members remain unchanged: based on common methods and evidence, the cartel overcharge was passed through to class members. My conclusions are based upon the application of economic theory to the facts of the case, documentary evidence, and testimonial evidence.

²³⁵ Section VII.D.5.b).

²³⁶ Section VII.D.5.a).

²³⁷ Original Report, Section VIII.B.2.

²³⁸ Section VII.D.4.

²³⁹ Original Report, Section VIII.A.1. and Section VII.B.1 above.

²⁴⁰ Willig Dep., pp. 63:16-63:23.

²⁴¹ Original Report, Section VIII.A.3.d).

²⁴² Original Report, Section VIII.A.3.a).(2).

In my original report, I explained that economic theory shows firms increase price when faced with a significant, non-transitory, industry-wide increase in cost.²⁴³ This is true regardless of the market structure of the industry facing the cost increase; that is, economic theory shows that such an increase in cost leads to an increase in price whether the industry is monopolistic, oligopolistic, or competitive. The incentives to increase price in response to a cost increase are particularly strong when the following conditions are true: the cost increase affects all firms without changing their relative competitive position and the cost increase is perceived to be non-transitory. In the context of this case, economic theory predicts that CRT product prices increase when CRT prices increase.

I also presented documentary evidence, which consistently indicates that the pass-through of tube prices to product prices occurs.²⁴⁴ This evidence included direct statements indicating that pass-through occurs as well as evidence linking tube prices with CRT finished product “street” prices. I explained how certain pricing practices, such as “cost plus” pricing ensure that cost changes are passed-through.²⁴⁵ Finally, I showed why certain pricing practices and patterns are not informative for determining whether pass-through in the face of a cartel occurs; specifically, price variation across firms and/or products, discount pricing, pricing below cost, or focal point pricing are not inconsistent with pass-through.²⁴⁶

2. Summary of Prof. Willig’s criticisms

Prof. Willig does not contest any of these conclusions. In fact, Prof. Willig provides no discussion of the economic theory of pass-through nor does he present any documentary evidence suggesting that pass-through does not occur. Prof. Willig’s conclusions regarding common impact to indirect purchasers fall into three general categories:

- Analyses and anecdotes that are premised upon the incorrect experiment.
- Straw-man arguments that conflate “uniform” pass-through rates and common impact.
- Analyses that present information that is either not pertinent to pass-through or is otherwise insufficient to determine how cost changes result in price changes. Specifically, Prof. Willig discusses price levels, price dispersion, and changes in price levels; these analyses all lack the requisite information to make conclusions about pass-through. These analyses are misleading because they incorrectly make the relationship between CRT costs and CRT finished goods prices appear overly complicated and confusing. More problematic, though, is the fact that these analyses simply do not address the issue of pass-through because they contain no information on costs; I discuss this latter deficiency in Section XIII below.

I discuss each of Prof. Willig’s conclusions in turn below.

²⁴³ While some economic models predict that not all cost changes will be passed through, those models are not applicable to the type of cost increased caused by a cartel. I provide a more complete discussion of the economic theory related to pass-through in Section VIII.C.1 of my original report.

²⁴⁴ See Section VIII.C.2 and Exhibits 29-32 of my original report.

²⁴⁵ See Section VIII.C.3 of my original report.

²⁴⁶ See Section VIII.C.4 of my original report.

B. Distribution chain

Prof. Willig argues that the distribution chain for finished CRT products is long and complex; he also argues that resellers sell finished CRT products at prices that vary widely and that those prices change differently across various resellers. In Sections XIV.A I explain how he overstates the degree of price dispersion and in Section XIV.B I explain why price dispersion and changes in price levels are not informative to pass-through; therefore, in this section I only address his claim that the distribution chain is long and complex, which is false.

Prof. Willig's description of the distribution chain is overly complex and based on two false assumptions:

- Different business models constitute a different channel of distribution, and
- The number of steps in the distribution channel is relevant for assessing whether cost changes are passed-through to the end-users.²⁴⁷

1. Different business models

Prof. Willig complicates the manner in which CRTs flow from Defendants to end users. Prof. Willig's Exhibit 23 presents a range of different types of business models operating at each level of the distribution chain. Although there is a range of different business models employed by the various firms that resell CRTs or CRT products, these business models merely distinguish between various terms and conditions by which these resellers conduct business; however, these terms and conditions are not relevant for understanding how CRT products are distributed. What matters is the function that each firm performs: do they make CRTs or CRT products, do they distribute CRTs or CRT products, or do they sell CRT products to end users.

For example, Prof. Willig identifies five types of CRT product manufacturers: vertically integrated TV manufacturers; vertically integrated monitor manufacturers; monitor ODMs and Contract Manufacturers; PC OEMs; and, finally, TV OEMs. These five types of firms, while possibly employing different business models, share one common, relevant trait: they produce CRT products. That is, they purchase CRTs and sell finished CRT products. The distinctions that Prof. Willig highlights are not meaningful for understanding how these products flow through the distribution chain; furthermore, there is considerable evidence that Defendants, resellers, and other market participants do not make these distinctions.

2. Number of steps in distribution

The false distinctions that Prof. Willig creates give the appearance that the distribution chain is more complex than it actually is; regardless, the number of steps in the distribution chain is not relevant for assessing the degree of pass-through. That is, the pass-through rate over the entire distribution chain is the relevant measure in order to determine whether the cartel had a common impact on class members: if at least some portion of the overcharge is passed-through at each level of the distribution chain—regardless of the number of steps in the distribution chain or the pass-through rate at each step—then end users have been harmed.

Furthermore, I expect the channel-length pass-through rate to be relatively consistent regardless of the number of intermediary resellers for one fundamental reason: consumers at the end of the

²⁴⁷ Willig Report, ¶121.

distribution chain have a choice where to buy CRT products and resellers are competing for their business. Intense competition among resellers will lead to prices that reflect the cost of providing the CRT product plus the cost of other services the reseller is providing, such as customer service. Now suppose that the price of CRTs rises. If the resellers do not pass through the cost increase, they will not be covering their full costs of providing the CRT product and other customer services. Firms facing intense competition cannot absorb significant, permanent, and industry-wide cost increases.

C. Prof. Willig ignores economic theory and market conditions in his evaluation of pass-through

Although Prof. Willig repeatedly discusses the various market conditions that impact firms' price setting decisions, he fails to address the fact that competition is intense among resellers of CRT products at all levels of the distribution chain and the implication of that competition with regard to pass-through. Economic theory shows that as competition increases the pass-through rate of industry-wide cost changes approaches 100%.²⁴⁸ The record evidence establishes that CRTs account for a large portion of finished CRT product prices.²⁴⁹ Deposition testimony from Costco presents real world evidence consistent with both the economic theory and the documentary evidence I present. Specifically, Costco testified that:

- Competition is intense.²⁵⁰
- Costco's margins for CRT products are thin.²⁵¹
- Costco does not sell below cost²⁵² and, therefore Costco cannot absorb significant, permanent, industry-wide cost increases, comparable to those alleged in this matter, without increasing prices. Costco's policy against selling items below costs means they are unable to absorb any cost increases that are larger than the profit margin on an item; therefore, these cost changes are passed-through.

Prof. Willig does not contest the economic theory I present, nor does he offer documentary evidence to the contrary. Specifically, in my Original Report I present economic theory establishing that pass-through is positive in both perfectly competitive and imperfectly competitive markets; similarly, I explain why the pass-through rate is closer to 100% for more

²⁴⁸ Original Report, Section VIII.C.1.c.

²⁴⁹ Original Report, Section XII.A.

²⁵⁰ "So, that would be – I mean, it's not like we're making 20, 25 points. I mean, it's a very competitive market and we have to have value. So, I'd have to look at a specific example of what you're referring to on a cost increase to give you a little more clarity on that." 07 December 2012, Deposition of Costco Wholesale Corporation 30(b)(6) Witness Geoffrey Shavey (Hereinafter "Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012"), p. 114:1- 4.

²⁵¹ "Q. Between the period 1995 to 2007, was there a general range of profit margins that Costco tried to achieve on CRT products that it sold? A. I would say the range was as low as five and up to 12, and then – really, the – the maximum margin that we're allowed to make on any item within the Costco system is 14 percent." Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, p. 122:2 - 8.

²⁵² Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 122:15 - 124:5.

competitive the industries. Furthermore, he provides no explanation for why his anecdotal evidence is inconsistent with economic theory, market conditions, and the evidentiary record.

D. Prof. Willig's analyses and evidence are premised on the incorrect experiment

In an effort to establish that there is not common impact to class members, Prof. Willig presents several analyses that highlight specific instances in which pass-through may not have occurred. These analyses are flawed and merely illustrate anecdotes from which one cannot draw any meaningful conclusions regarding pass-through.

An appropriate experiment from which to infer the pass-through rate in this matter assesses how resellers respond when faced with cost changes that are comparable to the alleged overcharge. Specifically, how do resellers react to cost increases that are significant, permanent, and affect all firms without changing their relative competitive positions? Many of Prof. Willig's analyses do not correspond to this experiment; rather, he is asking whether there are any instances in which a cost change does not result in a price change. In so doing, he merely identifies isolated instances in which specific cost changes may not have been passed-through; based on this information he concludes that the alleged cartel overcharges were not passed-through in a common manner. This approach is inapposite, though, because he provides no evidence that the cost changes he examines are, in fact, comparable to the cartel overcharges.

Prof. Willig selects specific cost changes from the reseller data used for the pass-through studies that, unlike the cartel overcharges, may be insignificant, temporary, or not faced by all resellers.²⁵³ The absence of any of these three characteristics of a cost change is likely to result in different behavior by the reseller. For example, a reseller is less likely to pass-through a small cost increase that it knows will only last for a few weeks; the reseller is even less likely to pass through this same cost increase if its competitors are not also facing a similar cost increase.²⁵⁴ As I explained above, competition forces resellers to pass through industry-wide, significant, and permanent cost changes; however, competition also precludes resellers from passing-through cost changes that do not satisfy all three criteria. Many of Prof. Willig's anecdotes rely on examples of firm-specific, small, and/or temporary cost changes; observing this type of behavior is not informative of how a reseller would react when faced with an industry-wide, significant, and permanent cost change such as the alleged overcharges in this matter.

The difference between my approach and Prof. Willig's approach is that I am asking whether cost changes comparable to the cartel overcharges were passed-through, whereas Prof. Willig is asking whether every single cost change was passed-through. These are fundamentally different questions, which will result in different answers; however, only the former is relevant and applicable in this matter. In my data analyses, I examine all types of cost changes from which I infer the pass-through rate for the cartel overcharges, which is conservative because these data

²⁵³ For example, Best Buy testified that they regularly drop prices to liquidate obsolete products. Prof. Willig would observe these transactions as instances of no pass-through (i.e., there is no cost change, but prices are reduced). However, Best Buy also testified that they regularly receive "Vendor Funding" for these products, which is essentially a payment from the vendor to Best Buy help offset the reduced prices Best Buy charges. These payments are applicable to CRT products, but would not appear in the transaction data provided by Best Buy.

²⁵⁴ Costco testified that it may not be able to pass-through some cost changes due to competition with other retailers. That is, Costco is less likely to raise prices to its customers when other retailers are not also experiencing a similar cost increase. Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 114:16 - 115:9.

include some cost changes that are less likely to be passed-through than the cartel overcharges. In contrast, many of Prof. Willig's conclusions depend on cherry-picked anecdotes that are not informative to the pertinent question.

Although these data, which we both use to empirically measure pass-through using regression analysis, contain some cost changes that are not analogous to the cartel overcharges, they can still be used as a basis for an economically meaningful measure of the pass-through of a price-fixing overcharge, if they are used thoughtfully and carefully. This is true because, as I explained in Section IX.B of my original report, though these data do contain a variety of different types of cost changes, many of them are analogous to the alleged overcharge. Because these data include different types of cost changes (e.g., permanent and temporary; small and large; firm-specific and industry-wide), one can use them to conservatively measure pass-through,²⁵⁵ however, extracting isolated instances in an effort to show that pass-through does not occur in every event is unreliable and uninformative. Several of Prof. Willig's analyses merely highlight data anomalies that are neither comparable to the alleged overcharge nor are they representative of the data from which they are pulled; therefore, conclusions based on these selected data points are not informative.

I discuss each of these in more detail in Appendix B (Section XIII).

E. Prof. Willig confuses common impact versus “uniform” pass-through

Prof. Willig constructs a straw-man argument that misrepresents my conclusions regarding pass-through. He writes, “Dr. Netz contends that manufacturers and re-sellers passed through the elevated costs of CRTs and CRT finished products in a uniform and common manner, always passing through at least 100% of the elevated cost of CRTs to end-users.”²⁵⁶ Prof. Willig conflates the terms “uniform” and “common”, perhaps, in an effort to establish that class members were not commonly harmed; that is, he argues that class members were not commonly impacted because pass-through rates may not have been “uniform” across products, resellers, customers, location, and time. Contrary to his claims, I do not argue that pass-through is uniform,²⁵⁷ nor is this criteria necessary to show common impact to class members. As I understand the law, for purposes of class certification, determining the actual pass-through rate is not required: as long as it can be measured using common formulaic methods and is consistently above zero, then class members have been harmed. Based on the results of my pass-through studies, which employ common methods applicable to all class members, the pass-through rate is

²⁵⁵ Because small, temporary, and firm-specific cost changes are less likely to be passed-through, including these observations in the pass-through studies will yield conservative estimates of the pass-through coefficient.

²⁵⁶ See, e.g.,

- Willig Report, ¶30.
- Prof. Willig also stated during his deposition that I use the word “uniform” to describe my pass-through results. He insists I use this word, despite being advised that I do not. Prof. Willig is simply incorrect: the word “uniform” does not show up in either my Original Report or in my deposition in any context whatsoever.

²⁵⁷ My original report states, “I conclude that any overcharges were passed through to consumers at a common rate of at least 100%.” Original Report, p. 104. This is the same page that Prof. Willig cites to support his claims in ¶30 of his report.

uniformly positive and, therefore, class members have suffered common harm.²⁵⁸ In Appendix B (Section XIII), I show which of Prof. Willig's analyses are premised on his straw-man argument and explain how each of these analyses relies on his conflated understanding of uniform and common pass-through rates.

F. Prof. Willig's analyses are irrelevant

Prof. Willig presents multiple analyses that lack the fundamental information required to measure the pass-through rate; as such, these analyses are not informative of how resellers will respond to cost changes of any type. Specifically, he observes that price levels across CRT products were differentiated across retailers, products, and time, and that month-to-month changes in price levels are differentiated.²⁵⁹ He claims that such differentiation would lead one to "expect" pass-through rates to be different across CRTs and CRT products, retailers, customers, and time.²⁶⁰

Prof. Willig's conclusion is divorced from any foundation. First, the evidence he presents is misleading and exaggerates the degree to which products are sold at disparate prices or have disparate price changes. Second, one can infer nothing about pass-through (the relationship between changes in costs and changes in prices) from prices alone.

Data on cost changes *and* price changes are required to measure pass-through; one cannot make conclusions regarding pass-through on pricing information alone.²⁶¹ Specifically, these analyses of prices and price changes are insufficient to measure pass-through because they provide no information on how cost changes impact price changes. These analyses are informative to price dispersion, which is precisely what they measure; however, price dispersion and pass-through are different concepts requiring different types of information. Prof. Willig's Exhibits 1B, 2B, and 20 are based entirely on price levels and do not include any cost information of any type. While Prof. Willig's Exhibits 21 and 22 do include some cost information, these analyses are also deficient for making inferences about pass-through because he only presents price-to-cost ratios, which again says nothing about cost and price changes.²⁶² Prof. Willig apparently understands why these data are insufficient for measuring pass-through;²⁶³ however, he still uses these analyses to support his claims that disparate pricing patterns make it "unlikely" that pass-through is uniform across all resellers throughout the distribution channel.^{264,265}

²⁵⁸ In fact, Prof. Willig's own pass-through studies also consistently (although not uniformly) result in positive pass-through rates. See Willig Exhibit 25A.

²⁵⁹ Willig Report, ¶¶118-121 (updated in Errata) and Exhibits ER-1B and ER-2B.

²⁶⁰ Prof. Willig offers no support from economic theory and literature for his claim that price dispersion makes it unlikely that pass-through is common.

²⁶¹ Prof. Willig acknowledges this fact during deposition. Willig Dep., pp. 36:18-37:21.

²⁶² If a price-to-cost ratio changes, it could be that only price changed, or only cost changed, or both of them changed.

²⁶³ "However, the fact that Amazon charges higher prices for monitors that cost them more to procure says nothing about how it would respond to the alleged overcharge on a particular product." Willig Report, ¶130.

²⁶⁴ Willig Report, ¶119 (updated in Errata).

In Section XIV, I discuss the specific flaws with each of Prof. Willig's analyses. I first explain why each analysis is misleading; then I show why, even if these analyses were accurate, they cannot support Prof. Willig's conclusions because they lack essential information.

G. Direct Action Plaintiff (DAP) complaints

Prof. Willig relies upon complaints filed by several DAPs in this MDL to support his claim that "pass-through rates may sometimes have been zero".²⁶⁶ Upon closer inspection, it becomes clear that he is citing evidence that does not correctly frame the appropriate question; as such, he is relying on information that is incomplete, vague, and otherwise insufficient to support his claim. For example, he cites the Costco complaint which reads, "Costco was not able to pass on to its customers all of the overcharge caused by the conspiracy."²⁶⁷ This statement is vague in that it does not specify what portion of the overcharge Costco was unable to pass-through (e.g., it could be 99% or just 1%), nor does it indicate how frequently an inability to pass-through the overcharge occurred (e.g., it could be very infrequent or, alternately, on nearly all transactions). Regardless, using this quote to suggest that pass-through was sometimes zero is clearly misleading; in fact, Costco even testified that this exact paragraph was unclear and vague.²⁶⁸

As discussed in Section VIII.D, relying solely on anecdotal evidence is misleading and inappropriate. Many of Prof. Willig's empirical analyses exploit data anomalies or examine cost changes that are not comparable to the cartel overcharges; the results of these analyses are misleading and provide results that are not consistent with results based on a full and complete analysis of all the available data. In fact, during deposition Prof. Willig discusses this very problem regarding his empirical analyses,²⁶⁹ relying on incomplete and vague documentary evidence is similarly inappropriate and misleading.

²⁶⁵ However "unlikely" it might (or might not) be, the consistent results of the over 40 pass-through studies I have done are clear, pass-through is at least 100%.

²⁶⁶ See, e.g.,

- Willig Report, ¶122 and footnote 115.
- Defendants make the same point in their memo in opposition. Memo in Opp., p. 25.

²⁶⁷ Prof. Willig cites to the Costco complaint at ¶184. Willig Report, footnote 115.

²⁶⁸ See, e.g.,

- When asked whether he agrees with the statement "Costco was not able to pass on to its customers all of the overcharge caused by the conspiracy", Geoffrey Shavey testified that it was "very general" and "very broad." Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 113:2; 112:23 - 24.
- "So, I don't know what this is referring to. [...] I'd have to look at a specific example of what you're referring to on a cost increase to give you a little more clarity on that." Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 113:23 - 114:5

²⁶⁹ Specifically, he cautions about relying on data anomalies that are not representative of the entire dataset. See, e.g.,

- "But that's why we use percentages across a bigger sample, so that that [*sic*] kind of anomaly averages out in the data, it doesn't distort the data even when it does occur." Willig Dep., p. 153: 14-18.
- "And I thought it was a good idea to do that robustness test, although I don't think it's essential, because, again, you can always find exceptions to what's more ordinarily the case, sort of middle-of-the-month

Additionally, I have completed 11 pass-through studies for all of the DAPs that have produced usable data; the results of these studies all show pass-through of greater than 100%. See Section X.A.2 below.

IX. The overcharge imposed on direct purchasers can be measured using common methods based on common evidence

A. Overview of the issues

1. Summary of my conclusions

As discussed in my Original Report, because class members purchased CRT products such as TVs and monitors that incorporated Defendants' CRTs and did not purchase CRTs directly from Defendants, one method for measuring overcharges to these indirect purchasers is to first measure the overcharge Defendants imposed on their direct customers and to then measure the portion of that direct overcharge that was passed down the distribution chain to the members of the class.

Just as the conclusion that CRT prices were above but-for prices does not require estimating the but-for price, concluding that a particular economic model is relevant for the present case and that the necessary data for implementing the model are available or likely to be available does not require implementing the model. Conducting an economic analysis for the purpose of estimating the direct overcharge entails three general steps: specifying a model capable of answering the question of interest; collecting data on the variables of the model; and choosing a technique to extract the information needed by the model from the collected data.

I have described four widely-accepted economic models useful for providing a reasonable measure of the direct overcharge.²⁷⁰ These are not "my" methods; rather these are four widely-accepted and implemented economic models that I have identified from the field of economics as useful for the purpose of measuring the direct overcharge in this case. In addition to explaining how the model was relevant for estimating the direct overcharge, I also demonstrated that each approach is widely accepted and used in the field of economics; identified the types of data required for each method; explained how the required data for implementing the method was common to all class members; and demonstrated that each model has been estimated using real-world data similar to the data available or likely to become available in the present case.

My judgments in identifying capable models, understanding the necessary data, and determining appropriate estimation techniques are based on my experience in conducting related empirical research in the academic field and the antitrust litigation context. Similarly, my judgments regarding the likely availability of data are based on my review of the types of evidence Defendants and other firms in the CRT industry regularly collect as well as my experience in conducting related empirical research in the academic field and the antitrust litigation context.

things or things that extend in their effect across a broader part of the month than our sample suggests. Since these are percentages over bigger samples, I'm not worried about the fact that there could be extreme cases that this doesn't catch." Willig Dep., p. 154:7-18.

²⁷⁰ Original Report, Section IX.A.

2. Summary of Prof. Willig's criticisms

Prof. Willig does not contest that the models I have described are standard models from field of economics or that these models are regularly applied to the type of data available or likely to be available in the present case. Prof. Willig also does not contest that the requisite data is common to all class members. Instead, Prof. Willig opines on his assessment of the completeness of my description of the model and the assumptions underlying the use of the models I have described. Indeed, a number of what Prof. Willig offers as criticisms of the models I proposed are merely statements that do little more than point out that models require thought and that the results from models depend on the underlying assumptions.²⁷¹ These statements are not criticisms of my model but simply truisms about any model.²⁷² Moreover, Prof. Willig's conclusions are based on his understatement regarding the amount of detail I actually provided as well as ignoring the usefulness of models that are tied directly to the conduct at issue so that the predicted overcharge is restricted to be no higher than that which would occur if the cartel was fully effective (and can be appropriately scaled in a straightforward manner if the cartel is found to have been less than fully effective).

In the remainder of this section I review the economic models for estimating the overcharge to direct purchasers described in my Original Report in light of Defendants' criticisms of these models.

B. The economic determinants method controls for non-cartel related factors²⁷³

Defendants' expert acknowledges that the economic determinants method I proposed "could produce a reasonable estimate of but-for prices" but argues that in order to do so it must account for important differences in market conditions between the cartel period and the non-cartel period.²⁷⁴ I agree. However, contrary to Prof. Willig's claim that I am "silent on the issue" of taking into account potential changes in market conditions, I explained in my Original Report how a multiple regression model would be able to control for changes in demand, cost, and market structure variables unaffected by the conspiracy.²⁷⁵ Indeed, both Prof. Willig himself and Defendants' counsel contradict Prof. Willig's claim that I am silent on this issue.²⁷⁶

²⁷¹ See, e.g., Willig Report, ¶¶152 and 157.

²⁷² "Like any formal modeling, merger simulation forces assumptions to be made explicit. That, in turn, adds focus to the analysis by identifying what really matters, why it matters, and how much it matters... At the same time the evidence gathered indicates what modeling assumptions are appropriate." Werden, Gregory J. and Luke M. Froeb, 2008, Unilateral Competitive Effects of Horizontal Mergers, in Buccirossi, Paolo (Eds.), Handbook of Antitrust Economics, MIT Press: Massachusetts, 43-104, pp. 65-66.

²⁷³ This method is often called a before-and-after method. Original Report, footnote 264.

²⁷⁴ Willig Report, ¶148.

²⁷⁵ Original Report, Section IX.A.1.

²⁷⁶ See, e.g.,

- Prof. Willig points out that I identified "U.S. personal income, U.S. GDP, U.S. employment data, and a data series on 'global economic activity'" in order to "to control for changes in marketplace conditions that could affect demand for CRTs". Willig Report, footnote 153.

In addition to describing how multiple regression analysis could account for any such changes, I identified the cartel period and detailed explicit variables that could be used in the model as well as demonstrated existing sources for such variables.²⁷⁷ Moreover, I documented empirical studies in the economic literature that have implemented multiple regression using real-world data of the type I have described and provided references that this particular model is commonly implemented in antitrust litigation involving cartels.²⁷⁸

Prof. Willig asserts that conditions before and after the cartel are materially different than during the cartel's operation, particularly with respect to competition from LCD displays.²⁷⁹ This is the type of difference that can be controlled for in the regression with the inclusion of a variable measuring sales of LCDs. Prof. Willig agrees that the approach would give a reasonable estimate of the but-for CRT price "if any important differences in market conditions could be reflected in measurable and identifiable variables". Market research firms such as iSuppli and DisplaySearch collect many variables that measure changes in the economic environment, including sales of LCDs, LCD monitors, and LCD TVs (as well as other display technologies).²⁸⁰

The economic determinants method I described in my Original Report is a widely-accepted methodology that controls for non-cartel related price factors and that is capable of providing a reasonable basis for the direct overcharge using evidence that is common to the class.

C. VHS recorder and portable CD player manufacturers faced similar market conditions as Defendants

Another widely-accepted economic model useful for measuring the direct overcharge that I described in my Original Report uses economic outcomes in related industries as proxies for economic outcomes in the but-for world.²⁸¹ Defendants' claim that the closest I come to comparing the CRT industry to the VHS recorder and CD player industries that I proposed as potential benchmark markets was to assert that "because both CRT and the proposed benchmark products were eventually replaced by 'alternative technologies,' consumer considerations such as whether to buy a new version of the current technology or wait and purchase the emerging

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- Defendants' counsel directly acknowledge that I explicitly recognize in my Original Report "that any before and after prices would need to be adjusted for variables that affected supply and demand of CRTs." Motion In Opp., p. 37:11-13.

²⁷⁷ See Original Report, pp. 85-89 and accompanying footnotes.

²⁷⁸ Original Report, footnotes 264-279.

²⁷⁹ Willig Report, ¶149.

²⁸⁰ See, e.g.,

- DisplaySearch, 2003, Quarterly LCD TV Shipment and Forecast Report, CHWA00197071 - CHWA00197269.
- iSuppli, 2006, Monitor Revenues Dip on Falling LCD Prices, Seasonal Sluggishness - Worldwide Monitor Market Tracker, LGE00069046.
- DisplaySearch, 2007, Quarterly Large-Area TFT LCD Shipment Report, CHU00179905.

²⁸¹ Original Report, Section IX.A.2.

technology were likely to have been similar between the CRT industry and the benchmark industries.”²⁸² Defendants’ claim is false.

In my Original Report I described how the VHS recorder and CD player manufacturers shared important supply and demand conditions with the CRT industry.²⁸³ In addition, I explained that some of the same firms, including some of the Defendants, manufactured CRTs and the benchmark products so that observed differences between markets would be less likely to reflect differences in management abilities or brand recognition. Moreover, I noted that the data available for each market are likely to overlap substantially given they originate from the same firm. Finally, I explained that firms regularly track data to compute profitability measures and demonstrated that the record evidence contained such data for Defendants.²⁸⁴

Prof. Willig asserts that the benchmark method I proposed “assumes that Defendants’ CRT operations earned higher profit margins than manufacturers of VHS recorders and portable CD players” and criticizes me for not including a comparison of profit rates for CRTs versus VHS recorders or portable CD players.²⁸⁵ This argument is invalid. First, the appropriate scientific approach to measuring damages is to, *ex ante*, without knowing the answer the method would come to, choose the method that is applicable to the particular case at hand. Choosing a method *because* it gives the results that would benefit my client is not the type of work that I do. Second, benchmarks can include comparisons of relative profit rates, not levels of profit rates. For example, consider the situation in which, prior to the cartel, Defendants’ CRT profit margins were 30% below the profit margins earned on VHS and portable CD players and during the cartel period CRT margins were only 10% below the profit margins earned on VHS and portable CD players. Even though the Defendants’ CRT margins are below the profit margins both before and during the cartel, contrary to Prof. Willig’s assertion, the benchmark products would not imply that the alleged cartel was ineffective.

Prof. Willig also points out that the benchmark comparison would be sensitive to how well the market outcomes in the benchmark product markets are matched with the CRT market.²⁸⁶ This is a mere truism for any comparison method. There are various ways in which the data could be matched to allow comparisons across markets. For example, a straightforward implementation would be to match outcomes in each industry by date and use a multiple regression analysis to control for differences between markets.

Characteristics common across the industries support the conclusion that the VHS recorder and portable CD player industries may be reasonable proxies for the but-for CRT industry. The benchmark comparison method I described in my Original Report is a widely-accepted and widely-implemented formulaic method for providing a reasonable basis to measure direct overcharges using common evidence.

D. The market power method provides a reasonable measure of the overcharge

²⁸² Motion in Opp., p. 38:20-24.

²⁸³ Original Report, Section IX.A.2.a).

²⁸⁴ Original Report, Section IX.A.2.b).

²⁸⁵ Willig Report, ¶151.

²⁸⁶ Willig Report, ¶152.

Prof. Willig criticizes the market power method I described because he disagrees with the underlying assumption that the cartel was able to effectively enforce the cartel price among its members.²⁸⁷ The but-for price suggested by any method will be subject to the accuracy of the underlying assumptions, and must be implemented carefully to obtain a reasonable estimate of the but-for price. The market power method has the advantage that the estimated but-for price is directly tied to the conduct at issue in a straightforward way. That is, even if Prof. Willig's conjecture that the cartel was not fully effective is ultimately borne out, the market power method still provides a basis from which to obtain a reasonable measure of the overcharge as the but-for price can be scaled appropriately by a measure of the cartel's effectiveness. A second advantage of the market power method is that it caps the overcharge to be no higher than that which would occur if the cartel was fully effective. Consequently, it provides a reasonable upper-bound on the overcharge.

The issue of the effectiveness of the cartel is yet to be determined. Prof. Willig argues that the assumption that the cartel was fully effective is not true because actual CRT prices do not perfectly match target prices.²⁸⁸ This logic is flawed. Prof. Willig and I both discussed the imprecision of the target price data and the resulting bias against finding that actual and target prices lined up perfectly.²⁸⁹ Even individual firms do not always hit their desired price targets as consumer demand and other market forces are not perfectly predictable. The record evidence that actual prices closely matched target prices supports the conclusion that the cartel was effective.²⁹⁰

Prof. Willig does not dispute that the market power method provides a widely-accepted and widely-implemented formulaic method for measuring direct overcharges based on common evidence. In fact, the implication of Prof. Willig's criticism is that the market power method restricts the predicted overcharge to be no higher than that which would occur if the cartel was fully effective; this is an advantage, not a flaw.

The market power method I described in my Original Report is a widely-accepted and widely-implemented formulaic method based directly on the conduct at issue for providing a reasonable basis to measure direct overcharges using common evidence.²⁹¹

²⁸⁷ Willig Report, ¶154.

²⁸⁸ Willig Report, ¶155.

²⁸⁹ See,

- Section VII.D.4.
- Original Report, pp. 61-62.
- Willig Report, ¶¶105 - 114

²⁹⁰ See,

- Original Report, Section VIII.A.3.b.
- Section VII.D.

²⁹¹ Original Report, Section IX.A.4.

E. The merger simulation method provides a reasonable measure of the direct overcharge

Prof. Willig's criticism of the merger simulation approach – that it assumes the cartel acted as a single entity²⁹² – is no more persuasive than this same criticism was for the market power method. It merely states that the basis for the overcharge would be limited to be no more than that which would occur if the cartel were effective.

Similarly, Prof. Willig's criticism about the merger simulation approach being sensitive to the underlying assumptions is no more than a truism about any model.^{293,294} In my Original Report I described the necessary components of the merger simulation model (consumer demand, cost conditions, and firm interaction)²⁹⁵ as well as the data from the case that would inform the required assumptions so that the implemented merger simulation model would reflect the facts and data of the case at hand.²⁹⁶ Prof. Willig specifically mentions the need to control for entry and exit from the market.²⁹⁷ Entry and exit are issues for the merger simulation approach in the merger context because there the issue is to forecast into a future economic environment that may include entry or exit. In the current case, however, the issue is to apply the simulation methodology to the economic environment (demand, cost conditions, and type of firm interaction) that actually existed to see what the estimated outcome would have been in that environment if the type of firm interaction is altered from one in which Defendants set prices jointly to one in which Defendants competed independently. Prof. Willig's speculation that entry

²⁹² Willig Report, ¶156.

²⁹³ Willig Report, ¶¶157-158.

²⁹⁴ “Like any formal modeling, merger simulation forces assumptions to be made explicit. That, in turn, adds focus to the analysis by identifying what really matters, why it matters, and how much it matters... At the same time the evidence gathered indicates what modeling assumptions are appropriate.” Werden, Gregory J. and Luke M. Froeb, 2008, *Unilateral Competitive Effects of Horizontal Mergers*, in Buccirossi, Paolo (Eds.), *Handbook of Antitrust Economics*, MIT Press: Massachusetts, 43-104, pp. 65-66.

²⁹⁵ Economists regularly estimate consumer demand, costs, and firm interactions using the type of real-world data available in the present case. See, e.g.,

- “Nearly all the literature considers differentiated consumer products, and much of it focuses primarily on demand estimation of a variety of models.” Werden, Gregory J. and Luke M. Froeb, 2008, *Unilateral Competitive Effects of Horizontal Mergers*, in Buccirossi, Paolo (Eds.), *Handbook of Antitrust Economics*, MIT Press: Massachusetts, 43-104, p. 75.
- “Generally, if the business is an ongoing concern, then the costs can be determined from existing data. Often this is done either by directly modeling the costs needed for the additional revenues or using regression analysis that captures how costs have varied with revenues.” Allen Mark A., Hall, Robert E, et al., 2011, *Reference Guide on Estimation of Economic Damages*, Reference Manual on Scientific Evidence, Third Edition, National Academies Press: Washington, D.C., 425-502, p. 499.
- “The key strategic variables can usually be inferred from company documents since, for example, those who compete on prices may well actively study their rivals’ prices and analyze whether they in turn are pricing at the right level in light of that analysis.” Davis, Peter and Eliana Garces, 2010, *Quantitative Techniques for Competition and Antitrust Analysis*, Princeton University Press: Princeton, p. 403.

²⁹⁶ Original Report, Section IX.A.3.

²⁹⁷ Willig Report, ¶158.

or exit would have been different in the but-for world goes beyond altering the conduct of Defendants.

The merger simulation method I described in my Original Report is a widely-accepted and widely-implemented formulaic method for providing a reasonable basis to measure direct overcharges using common evidence.

F. Measurement of the antitrust overcharges to direct purchasers is susceptible to common proof

In my Original Report I detailed the necessary elements of four widely-accepted economic models useful for obtaining an economically reasonable measure of the direct overcharge that have been implemented in the academic field and in antitrust litigation using real-world data of the type available or likely to be available in the present case. In addition, based on the available evidence as well as my experience in conducting empirical research in the academic field and the antitrust litigation context, I concluded that the necessary data to implement these approaches are likely to be available in the present case. These required data are common across the proposed class members.

After reviewing the Defendants' expert's report and Defendants' counsels' memo in opposition to class certification, my conclusions remain unchanged. There exist multiple methods to measure overcharges to direct purchasers that are susceptible to common proof.

X. The pass-through rate to class members can be measured using common methods based on common evidence

In Section VIII I establish that, based on common methods and evidence, at least some portion of the cartel overcharge was passed through to class members, which establishes impact to class members. To calculate damages to class members based on the overcharge imposed on direct purchasers, I need to measure what share of the overcharges was passed-through to class members. After reviewing Prof. Willig's report, my conclusion remains that both the evidence and the method I employ to estimate the pass-through rate are susceptible to common proof.

A. Overview of the issues

1. Summary of my conclusions

To estimate pass-through rates, I regressed the price of CRTs or CRT products on cost; this approach can be implemented for any portion of the distribution channel or over the entire channel. In either case, the coefficient on the upstream cost variable gives the pass-through rate. Price and cost data are required to calculate the pass-through rate, but there may be some product characteristics (e.g., screen size) that also impact the price level. To the extent possible, I included variables to control for different product characteristics; the composition of each dataset determines those characteristics for which I can control in each study. I ran separate regressions for monitors and TVs and, whenever possible, I controlled for the economically meaningful

product attributes including screen size, CRT manufacturer, resolution, high definition, and flat screen.²⁹⁸

Including additional regressors in the pass-through analyses does not affect the interpretation of the coefficient on the cost variable as the pass-through rate, nor does it constitute the use of a different method in any respect; rather, the inclusion of these regressors is a variation on the same method of regressing downstream price on an upstream cost. The purpose of adding additional regressors is to account for the unique characteristics inherent in each dataset.

2. Updated results

Defendants claim my pass-through studies are based on “tiny, unrepresentative samples of pricing data.”²⁹⁹ This claim is false, which I fully explain in Sections II.2 and II.3 of my MTS Report. The data I analyze include large national resellers such as Best Buy, Kmart, and Sears, representing over 74 million CRT products sold to end users. Sales through retailers begin in 1994 and continue into 2011. The pass-through studies also contain large product distributors including Ingram Micro and Tech Data, representing almost 4 million CRT products sold beginning in 1997 and ending in 2010. Studies for CRT monitor and television product manufacturers contain sales of over 37 million CRT products, beginning in 1995 and ending in 2009. I conducted two studies for tube distributors, containing sales of 15 million tubes beginning in 1994 and ending in 2002. Combined, my pass-through studies encompass over 131 million tubes and CRT products sold across all levels of the distribution chain.” I have put forth a common method that relies upon common data; if more usable data becomes available, I can use the data using this same method.

Additionally, as discussed in Section VIII.G above, both Prof. Willig and Defendants’ claim that the complaints from various Direct Action Plaintiffs (DAPs) contradict my pass-through studies. I have completed additional studies in direct response to this claim. Using DAP data, I have completed 7 new pass-through studies using data from K-Mart, RadioShack, bestbuy.com, and Sears; these studies are in addition to the 4 studies using DAP data included in my original report (Best Buy and Costco).³⁰⁰ See Exhibit RR-34. The results for all of the DAP studies show pass-through greater than or equal to 100%; the pass-through rates range from 100% for monitors sold at Sears to 137% for televisions sold at Best Buy.

Using the method described above, I have now performed 47 total pass-through studies including the 7 new studies described above. I have updated the Exhibits that summarize the findings of all the studies I have completed at this point. Exhibit RR-34 lists the calculated pass-through rates and other statistical results for each of the studies I have conducted to date; new and updated

²⁹⁸ Although there are other product characteristics, application, size, resolution, and manufacturer are the characteristics commonly used to differentiate CRTs products. Not all datasets provided sufficient detail to control for all of these attributes, while some datasets provide additional information, allowing me to control for other attributes including, but not limited to: VCR or DVD TV combinations, wide screen, HD-ready, picture-in-picture, and re-manufactured/refurbished products.

²⁹⁹ Memo in Opp., p. 24.

³⁰⁰ The data for these new studies was made available to me too late to include the results in my Original Report. I completed these new studies to respond to the assertions made both by Prof. Willig as well as by Defendants in their Opp. memo.

studies are highlighted in this exhibit.³⁰¹ Exhibit RR-35 provides information about the firms, the data they provided, and the specification for each of the studies I have conducted to date. Exhibit RR-36 lists the files relied upon for each pass-through study.

Exhibits RR-37 through RR-39 plot the calculated pass-through rate and corresponding 95% confidence interval for each of the studies.³⁰² All 47 of the confidence intervals either include 100% or are wholly above 100%. The 36 studies with confidence intervals wholly above 100% are the studies that find a pass-through rate that is statistically significantly greater than 100%. For these studies, because the value 100% is completely below the confidence interval, I conclude that, with 95% confidence, the pass-through rate is greater than 100%. The remaining 11 studies with confidence intervals that include 100% are studies that result in pass-through rates that are not statistically significantly different from 100%. None of the confidence intervals are wholly below 100%, meaning none of the studies result in a pass through rate that is statistically significantly less than 100%.

Exhibit RR-40 summarizes which segments of the distribution channel are covered with each study. I present two studies that measure pass-through from Defendants selling CRTs at the top of the channel to end customers purchasing CRT products at the bottom of the channel; 47 studies measure pass-through for portions of the distribution channel. Collectively, these studies cover the entire distribution channel and portions of the distribution channel, include both types of at-issue CRT products, and represent all the various types of buyers and resellers operating in the distribution channel. The total number of CRTs represented in these datasets is over 131 million. These datasets include transactions beginning as early as 1994 and continuing into 2011. Exhibits RR-41 to RR-43 summarize the time periods covered by each study.

Based on these econometric studies, I conclude that any overcharges were passed through to consumers at a common rate of at least 100%. Of the 47 studies I have completed, 36 found a pass-through rate statistically greater than 100% and 11 were not statistically significantly different from 100%. These results are based on common evidence and methods; the results show that all class members suffered common harm of at least 100% of the overcharge imposed by Defendants.

3. Summary of Prof. Willig's methods and criticisms

Prof. Willig and I both use regression analysis to estimate pass-through rates; his method is a variation on the approach I employ. Prof. Willig's regression model assumes that there is unobserved product-level heterogeneity that affects the estimated pass-through rate. If there is unobserved product-level heterogeneity that is correlated with the cost variable and it is not properly controlled for, the estimated pass-through rate will be biased and inconsistent. To control for this heterogeneity, he includes in his regression fixed effects (i.e., dummy or indicator variables) for individual products which he claims "fully controls" for differences between

³⁰¹ Updated studies are any study that was included in my Original Report, but that I have made some changes based on information that has become available since submitting that report. These are explained in Section XII below.

³⁰² A 95% confidence interval is a range that is expected to contain the actual value of interest (in this case, the pass-through rate) 95% of the time the range is estimated. Wooldridge, Jeffrey M., 2000, *Introductory Econometrics: A Modern Approach*, South-Western College Publishing, p. 134.

products. He also includes a time variable, which he argues captures trend changes in market conditions.³⁰³

Prof. Willig claims that my regression method does not properly control for differences across products because it does not perfectly explain differences in demand.³⁰⁴ The fundamental difference between his approach and mine is that I control for those product differences that are economically meaningful, whereas Prof. Willig controls for any and all differences between two products, regardless of whether or not those criteria are likely to have an impact on price. Controlling for every single difference between products is both unnecessary and inappropriate given the data available, which is evidenced by the results of his studies; see Section X.B.1 and X.B.2 below. Prof. Willig provides no explanation for why nearly identical products would have significantly different prices. Below I present examples of products that Prof. Willig treats differently, although they are fundamentally the same product; in fact, in many instances, they are identical.

The divergent pass-through rates for specific monitors sold by Amazon that Prof. Willig calculates illustrate why his approach of controlling for differences between products is flawed. He provides no explanation for the divergent pass-through rates he gets for similar, and nearly identical, products. Instead, he simply argues that these divergent rates suggest common impact is unlikely;³⁰⁵ on the contrary, the divergent, at times non-sensical, rates suggest that his method of controlling for product-specific differences is flawed. The range of product-specific pass-through rates he calculates, which includes economically meaningless results, further undermines the validity of his method. In contrast, I control for the relevant economic characteristics whenever possible and the results of my studies are consistent with economic theory and the documentary evidence.

B. Prof. Willig's own results undermine his method

In Section X.C, I discuss some of the specific problems with the regression specification that Prof. Willig uses to measure the pass-through rates he reports in Willig Exhibit 25A. In this section, I explain why his approach of controlling for product-specific differences is flawed by first examining specific products that he treats individually, showing that they are often, in fact, not different. Then, I examine the regression results he presents in Willig Exhibit 27. In this exhibit he calculates product-specific pass-through rates for monitors sold by Amazon, which is a variation of the approach he uses to calculate the rates in Willig Exhibit 25A to calculate pass-through for individual firms. He argues that his firm-level analysis masks considerable variation in pass-through rates for specific products, which he presents in his Exhibit 27A. In both cases, the underlying assumption is that there are product-specific differences that are meaningful for determining pass-through; however, his product-specific pass-through rates in Exhibit 27A expose why this is false.

1. Prof. Willig controls for “differences” between identical products

³⁰³ Willig Report, ¶133.

³⁰⁴ Willig Report, ¶¶127-130 and footnote 128.

³⁰⁵ Willig Report, ¶138.

Prof. Willig's approach identifies unique items according to whatever product identifiers are available in the data. These product identifiers are often created by resellers, as opposed to the CRT product manufacturers, and do not necessarily provide economically meaningful distinctions between products. For example, in his Amazon study, Prof. Willig distinguishes between CRT products by using the "Amazon Standard Identification Number", or "ASIN",³⁰⁶ which is a unique number Amazon assigns to products when they are added to the website. These numbers are often used for inventory or other internal business functions, though. For example, the NEC AccuSync AS700 monitor was available from Amazon in two colors, black and white; Amazon assigned each color a distinct ASIN. Although color may be important for keeping track of Amazon inventory, it is not a significant determinant of pass-through.³⁰⁷

Examining the data provided by Circuit City further illustrates the issue. In this study, Prof. Willig treats the following products differently because they had a different product identification numbers recorded in the Circuit City data:

- Two 15-inch flat screen monitors Sony monitors, identified as "HMDA100" and "HMDA100L" in the data. These products are identical, except that one has a white case and one has a blue case.³⁰⁸
- Two Broksonic televisions, the CTS GT-2799C and CTS GT-2799T, are actually identical 9-inch televisions with a built-in VCR.³⁰⁹

These are not isolated examples; this problem is pervasive in the data Prof. Willig uses for his studies. He claims to "fully control for differences between products";³¹⁰ however, his approach

³⁰⁶ "Amazon Standard Identification Numbers (ASINs) are unique blocks of 10 letters and/or numbers that identify items. [...] For books, the ASIN is the same as the ISBN number, but for all other products a new ASIN is created when the item is uploaded to our catalogue." Amazon.com, Undated, What are UPCs, EANs, ISBNs. and ASINs?, <http://www.amazon.com/gp/seller/asin-upc-isbn-info.html>, accessed 28 January 2013, p. 2.

³⁰⁷ See, e.g.,

- Amazon.com, Undated, NEC AccuSync AS700 17" CRT Monitor (White), <http://www.amazon.com/NEC-AccuSync-AS700-Monitor-White/dp/B00019OBS2>, accessed 29 January 2013.
- Amazon.com, Undated, NEC AccuSync AS700-BK 17" CRT Monitor (Black), <http://www.amazon.com/NEC-AccuSync-AS700-BK-Monitor-Black/dp/B00019OCRW/>, accessed 29 January 2013.

³⁰⁸ This product accounts for approximately 15,000 units sold. See, e.g.,

- Sony, Undated, Sony HMD-A100 Marketing Specifications, http://www.docs.Sony.com/release/specs/HMDA100_mksp.pdf, accessed 08 January 2013, p. 2.
- Sony, Undated, Sony HMD-A100/L Marketing Specifications, http://www.docs.Sony.com/release/specs/HMDA100L_mksp.pdf, accessed 08 January 2013, p. 2.

³⁰⁹ Broksonic CTS GT-2799C and CTS GT-2799T are identical 9-inch televisions with a built-in VCR. These account for approximately 154,000 units sold.

- Broksonic, Undated, Broksonic CTS GT-2799C, <http://www.broksonic.com/MainCTS GT-2799CA.htm>, accessed 08 January 2013, p. 1 - 4.
- Broksonic, Undated, Broksonic CTS GT-2799T, <http://www.broksonic.com/MainCTS GT-2799T.htm>, accessed 08 January 2013, p. 1 - 4.

³¹⁰ Willig Report, ¶133.

implicitly assumes there are economically meaningful differences between items simply because they have different identification numbers. The examples above show why the product numbers he uses are often not meaningful determinants of unique product.

2. Prof. Willig's product specific regressions

Prof. Willig runs different regressions to measure pass-through. In this section I discuss the flaws in how he conceptualizes the regression.

a) Prof. Willig's reported results are limited and misleading

If, as Prof. Willig asserts, it is necessary and appropriate to control for product-specific differences when calculating pass-through, one would expect to see reasonable results from the product-specific regressions that he does calculate. However, this is not the case, which is evident when examining the *full* results from Willig Exhibit 27A where he reports product-specific rates for monitors sold by Amazon. The subset of results he reports are, in fact, quite different from the full results: he claims the pass-through rates range from "almost zero to 2.65".³¹¹ Prof. Willig includes in Exhibit 27A a subset of his results, limited to the top-50 selling products that were also sold for at least 18 months.³¹² As a result, Willig Exhibit 27A only includes 36 products,³¹³ although there are 306 different ASINs in these data. Examining his full results shows a far wider range of pass-through rates, including many that are implausible, which he does not report or discuss. I have replicated his Exhibit 27A, using his exact method, but reporting the full range of results.

- Exhibit 33 replicates his Exhibit 27A, but I include all 55 CRT monitors that were sold for at least eighteen months. The pass-through rates range from negative 103% to positive 265%.³¹⁴
- Exhibit 34 presents this same analysis but includes all 306 products that were sold for any period of time. The pass-through rates range from negative 1,745% to positive 2,253%. Prof. Willig estimates negative pass-through rates for 23% of all models. These results imply that for some products a \$1 *increase* in cost will result in a \$17.45 *decrease* in price, while for others a \$1 cost increase results in a \$22.53 *increase* in price; neither is plausible.

The arbitrarily limited results Prof. Willig presents in Exhibit 27A are misleading in that they obscure the true range of pass-through rates he calculates for each product.³¹⁵

³¹¹ An estimate of 2.65 indicates a pass-through rate of 265%. Willig Report, ¶ 137.

³¹² Willig Exhibit 27B, note 3.

³¹³ Of the top-50 selling products, only 36 (72%) were sold for more than 18 months.

³¹⁴ Prof. Willig recognizes that negative pass-through rates don't make sense, and that if the pass-through rate is measured as negative, "it's not literally a pass-through". This is because "costs go up, price goes down for somewhat different reasons." Willig Dep., p. 168.

³¹⁵ During deposition, Prof. Willig acknowledges that the divergent firm-level rates he calculates mask product-level pass-through rates that are even more divergent; however, he again fails to reveal the actual range of product-level pass-through rates he calculates. See, e.g.,

b) Prof. Willig's results are implausible

Prof. Willig's actual range of results includes pass-through rates that are not believable and do not make any economic sense. Specifically, he fails to acknowledge the negative pass-through rates he calculates, and upon which he rests his conclusions, and why these results are economically meaningless. Negative pass-through rates are not only inconsistent with economic theory, they also defy common sense: the notion that an increase in cost for a product will result in a decrease in price for that same product, particularly at the magnitudes cited in the example above, is counterintuitive and certainly not a viable business strategy for any firm. Yet this is precisely the logic upon which Prof. Willig's conclusions regarding common impact are built. Positive pass-through rates that range up to 2,253% are equally implausible. These results suggest the following: the method that Prof. Willig proposes is inappropriate; the data he uses are incompatible with the method; or both.

Prof. Willig also calculates very different pass-through rates for nearly identical products. For example, in Exhibit 34 I show the full results of Prof. Willig's product-specific pass-through rates for Amazon. Included in this exhibit are two nearly identical monitors, the Viewsonic P75+ and P75+B, sold by Amazon. For the P75+ Prof. Willig's method calculates a pass-through rate of 41%, while the rate for the P75+B is 74%.³¹⁶ These monitors were sold during the same time period and are identical in all respects except for color: the P75+ is white and the P75+B is black. Similarly, Amazon sold a black and white version of the NEC FE992, a 19-inch flat screen CRT monitor, during the same time period. For the black version, Prof. Willig's method calculates a pass-through rate of 94%; however, the rate for the white version is negative 138%.³¹⁷ Prof. Willig provides no explanation for why products that are nearly identical would have such different pass-through rates.

These product-specific pass-through rates include meaningless figures which simply do not make any economic sense: they are neither believable (e.g., very large and/or negative pass-through rates) nor are they consistent (e.g., considerably different rates for similar products).

Nonetheless, Prof. Willig uses the results of these regressions to support his claim that pass-through cannot be estimated without controlling for even the most trivial difference in products;

-
- “And when I fixed her econometrics and made them much more appropriate for the purpose, much more professional for the purpose, still masking individual pass-through rates at a non-averaged level, I still got quite diverse pass-through rates across entities and I got some, out of these econometrics for particularly[sic] manufacturers, that were quite low or even statistically no different than zero in the few instances here that show on Exhibit 25A for the upstream players, the manufacturers.” Willig Dep., p. 161: 8-20.
 - “[T]hese averages mask lots of variation below the level of the averaging. And that's true as a matter of logic. Generally one has to be cautious with averages, but that's part of what the lesson was from Exhibit 24A, which by looking at the shares of cost change events that have no pass-through at all versus positive pass-through to a different extent, the point is that it's very significant cost changes. And so doing it at an average level of analysis masks lots – in these data, lots of examples within the categories of no pass-through at all.” Willig Dep., p. 174: 9-24.

³¹⁶ Amazon keeps track of products using the ASIN; see Footnote 306. The ASIN for the P75+ is B00006B6X2; the ASIN for the P75+B is ASIN B00006B6X3.

³¹⁷ The ASIN for the white versions is B00081G000; the ASIN for the black version is B00081AL32.

in fact, he even argues that further disaggregation beyond the product level is likely necessary.³¹⁸ On the contrary, examining his full results undermine his proposed method, showing why it is unnecessary and inappropriate to control for product differences at the level he proposes; in other words, his product-level regression results expose the false assumptions upon which his firm level analyses are predicated.

C. Prof. Willig's time trend variable is inappropriate

Prof. Willig includes a time variable that he claims accounts for general marketplace trends; he adjusts this variable by the lifetime average price for each product.³¹⁹ There are several problems with this approach, which I discuss below.

The "time trend" purportedly controls for general marketplace trends as well as product lifecycle (i.e., the tendency to reduce prices of older products). The variable Prof. Willig includes, though, does not necessarily capture how long a given product has been on the market, but rather captures how long a product has been sold by each firm.³²⁰ Furthermore, general marketplace conditions and individual product lifecycles are two distinct trends, which cannot be controlled for with the same variable.

Prof. Willig's time trend is also problematical because, as explained in Section X.B.1, he treats identical products differently based on whatever product identifier is available in the data. Often, however, a new product number is created although the new product is identical to the old one; as such, the time trend for the supposedly "new" version is reset.

For example, consider two identical 17-inch eMachines monitors sold by Circuit City: the first (eView 17f2) was sold from May 2003 and experienced declining sales beginning in May 2004; this product was replaced by the eView 17f3, which was sold from March 2004 through the end of 2007. Despite the fact that they are completely identical products in all respects,³²¹ Prof. Willig's method will assign a different time trend to each; in other words, it is inappropriate to treat the replacement model as a new product when it is identical in all respects.

³¹⁸ See, e.g.,

- "pass-through rates cannot reliably be estimated using a regression-based formulaic approach that pools together all products and time periods, and further disaggregation beyond the product-level disaggregation shown in Exhibit 27A is likely necessary." Willig Report, ¶138.
- Additional disaggregation would only further exacerbate his already implausible results.

³¹⁹ Willig Report, footnotes 165 and 175.

³²⁰ For example, a product could be at the end of its lifecycle in the first period the data is available, but would nonetheless be treated the same as a new product that introduced in the first period.

³²¹ These product have identical specifications. See, e.g.,

- The eMachines eView 17f2 is a 17-inch CRT monitor with a resolution of 1280x1024 and a dot pitch of 0.25 mm. CNET, Undated, eMachines eView 17f2 Specs, http://reviews.cnet.com/crt-monitors/emachines-eview-17f2-crt/4507-3175_7-30469667.html, accessed 08 January 2013 at 1.
- The eMachines eView 17f3 is a 17-inch CRT monitor with a resolution of 1280x1024 and a dot pitch of 0.25 mm. CNET, Undated, eMachines eView 17f3 Specs, http://reviews.cnet.com/crt-monitors/emachines-eview-17f3-display/4507-3175_7-31278691.html, accessed 08 January 2013 at 1.

Prof. Willig's treatment of products that are sold during the first period of each dataset is also problematic. Specifically, in the first period for each dataset, all products are treated as new products despite the fact that some are at the end of their lifespan, while other products are brand new.

Prof. Willig multiplies the time variable by each product's lifetime average price because he claims that prices of more expensive products decline more rapidly. This assumption is misguided. Whereas it may be correct that more expensive products tend to decline in price more rapidly, that is because the most expensive products also tend to be the most cutting edge and innovative products; however, there are many cutting edge and innovative products that are not the most expensive. In other words, it is innovative products that decrease in price more rapidly, not just expensive products.³²² For example, at one point DVD/VCR combos were cutting edge additions to CRT TVs of all sizes for which less price elastic customers were willing to pay a premium. Over time, though, the prices for these products dropped and the more price elastic customers also began purchasing these products. What is important, though, is that this innovation impacted the prices of all sizes of CRT TVs, not just the largest and most expensive, which is the inherent, and flawed, assumption in Prof. Willig's approach.

Additionally, Prof. Willig's time trend is linear which assumes that the price-cost margin for all products decreases at a linear rate over time. If the time trend for a particular product covers a long enough period of time, then Prof. Willig's model will necessarily predict a period where the reseller's margin becomes negative and, eventually, where the reseller is predicted to charge negative prices for the product.³²³

Finally, the time trend offered by Prof. Willig is collinear with the cost trend; that is, as time passes, advances in technology lead to cost reductions. Thus, even if the passage of time itself has no impact on the price charged, one is likely to measure a statistically significant coefficient on the time trend simply because it is correlated with the trend of the cost variable. The estimated statistical significance of the collinear time trend will come at the cost of a less precise estimate of the coefficient on the cost variable.³²⁴

D. Summary

After reviewing Prof. Willig's report, my conclusion remains that pass-through can be calculated on a common, formulaic basis for the class of indirect purchasers of CRT products. I have presented a common, formulaic approach that uses common evidence.

³²² One reason that innovative products of all price levels tend to decrease at a more rapid rate is that early adopters are less sensitive to price (in economic terminology, their demand is inelastic).

³²³ Prof. Willig does include a "scaled log" time trend as a robustness test. A logarithmic time trend assumes a more reasonable pattern of decaying margins over time (i.e., prices will never become negative); however, this trend is still adjusted by lifetime average prices, which is problematic. Prof. Willig does offer another robustness test that is not scaled by lifetime average prices; however, this test uses a linear time trend, which is also problematic.

³²⁴ In fact, this effect is what Prof. Willig claims to prove his assertion that pass-through is variable and not common across class members. Essentially, Prof. Willig adds a factor to his regressions which increases the variability of the estimated cost coefficient whether or not that factor has any relevant economic meaning in the pass-through model. He then claims that this increased variability is evidence that pass-through is not common to class members.

XI. Summary

After reviewing Prof. Willig's criticisms of my analyses, my conclusions are unchanged. I find that his arguments are misguided, flawed, and otherwise uninformative. I conclude that the cartel had a common impact on class members and that impact can be quantified using common methods based on common evidence.

XII. Appendix A: My pass-through results are qualitatively unchanged

Prof. Willig claims there are some problems with the data I used for a small number of pass-through studies.³²⁵ As a result, he either does not use these datasets for his analyses or he makes adjustments to these data that are inconsistent with my work.³²⁶ Prof. Willig also suggests that I adjust the weights I use to estimate my pass-through models. His comments regarding these specific datasets and weighting alternatives are not pertinent to the methods used to measure pass-through, but rather focus on the validity of these data and the implementation of the regression analysis; regardless, my responses to his criticisms are below.

A. Dell

Prof. Willig excluded the data provided Dell because monitors are sold both as standalone products as well as bundled with computer systems.³²⁷ Although retaining these products produces a lower pass-through rate, I have nonetheless replicated my study by dropping all products that were likely to have been sold as part of a bundle.³²⁸ The results of this modified study are essentially the same: in my original study, the pass-through rate was 126% and in the modified study is 129%.³²⁹

B. TACP

In my TACP pass-through study I excluded all sales that were labeled as “Not For Sale In USA & PR” because it appeared as if these products were not sold to class members. Because TACP has indicated that these sales were, in fact, made to U.S. consumers,³³⁰ I have updated my results to include these observations. The results of this updated study are essentially the same: in my

³²⁵ He testified that he generally used the identical data that I used, but for few specific datasets some additional information became available after my Original Report was submitted; based on this information, he makes certain adjustments to the data and/or studies. Willig Dep., p. 158: 10-24.

³²⁶ He makes adjustments to the data provided by Ingram Micro, TACP, and Circuit City. Willig Report, ¶166. He does not use data from Dell, Best Buy, and TAEC. Willig Report, ¶176.

³²⁷ See, e.g.,

- Willig Report, ¶176.
- He based this decision on communications with counsel for Dell indicating that revenue for bundled products is allocated at the order level, not the SKU level; as a result products sold as part of a bundle may have negative margins for that item, even though the margin for the entire order was positive. Ganske, Rodney, 20 November 2012, Letter, Re: Data Letter on Sales Data in Response to October 2, 2012 Subpoena to Produce Documents and Deposition Subpoena to Dell Inc.

³²⁸ That is, I drop all products with a negative margin, which according to Dell includes bundled products. It is possible that some of the dropped products with negative margins are not bundled products; similarly, it is possible that some of the retained products are bundled as well. However, the communication from Dell suggests that monitors sold as part of a bundle are likely to have negative margins; therefore, it is likely that dropping these observations primarily removes bundled products.

³²⁹ The original study was based on 20,102,240 units, whereas the new study is based on 11,757,157 units.

³³⁰ Willig Report, footnote 167.

original study, the pass-through rate was 112% and in the updated study is 116%.³³¹ See Exhibit RR-34.

C. Ingram Micro

Prof. Willig claims I used the incorrect cost variable in my pass-through study and he uses a different variable in his study.³³² This decision is based on a call between his staff and an Ingram Micro representative, but Prof. Willig has provided no backup or notes from this call nor does he explain why he believes the cost variable he uses is the “most reliable”.³³³ Because he has not provided any rationale for his decision, I have not made changes to this study and I stand by the results in my original report.

D. Best Buy

Prof. Willig did not use any of the Best Buy data because he claims the cost variable is based on lifetime average prices and, therefore, unreliable.³³⁴ I have inquired about this claim with counsel for Best Buy, but have not been given a reply. Since I submitted my original report, Best Buy has produced additional purchasing data that they have confirmed includes Best Buy’s actual costs for each unit.³³⁵ The results of this modified study are essentially the same: in my original study, the pass-through rate for monitors was 105% and in the updated study is 106%; the rate for TVs was 137% and in updated study is 144%.³³⁶ See Exhibit RR-34.

I have also recently received data for Best Buy’s online sales through bestbuy.com, which provides another opportunity to examine how Best Buy responds to cost changes. The results of this new study are consistent with the results for Best Buy’s in-store sales: the pass-through rate for TVs is 114% and the rate for monitors is 112%.³³⁷ See Exhibit RR-34.

E. Circuit City

Prof. Willig notes that I did not conduct a study using the data provided by Circuit City;³³⁸ the reason is that these data do not contain the necessary information to perform a pass-through

³³¹ The original study was based on 7,500,890 units, whereas the new study is based on 21,713,445 units.

³³² Prof. Willig uses the *Replacement Cost* variable, whereas I use the *Unit Avg Cost at Ship* variable. Willig Report, ¶166.

³³³ He has only indicated that “The Ingram Micro representative indicated that the Replacement Cost field was the most reliable measure of cost in the data.” This answer is insufficient because there are multiple measures of cost and some are more appropriate for measuring pass-through than others. Prof. Willig provided no indication that the Ingram Micro representative had sufficient training and expertise to evaluate the best cost variable to use in a pass-through regression analysis. Willig Report, footnote 166.

³³⁴ Willig Report, ¶ 176.

³³⁵ The data were produced by Best Buy on 24 October 2012. Best Buy counsel confirmed the meaning of the cost variable. Nelson, Laura E., 05 December 2012, Letter, Laura E. Nelson Response to Eva Cole's Email of November 29, 2012 and Data Questions.

³³⁶ The original monitors study was based on 3,285,540 units, whereas the new study is based on 1,816,469 units. The original TV study was based on 23,460,754 units, whereas the new study is based on 13,582,006 units.

³³⁷ The TV study is based on 451,192 units and the monitors study is based on 111,776 units.

³³⁸ Willig Report, footnote 135.

study. Specifically, these data contain product numbers, but they do not include any product description information; therefore, I am unable to confirm that each item is actually a CRT product nor am I able to code the product characteristics necessary for my method. Prof. Willig's flawed approach does not require product descriptions (he assumes that the product number is sufficient). However, as discussed in Section X.B.1, his study included identical products with different product numbers, and his study also included at least some non-CRT products.³³⁹ I, therefore, continue to not use these data.

F. Top-to-bottom study

Prof. Willig's claims regarding my top-to-bottom study are primarily repeats of issues I have already addressed above in Section X.A.3. In this section I address his claim that the results of the TAEC segment of my top-to-bottom pass-through study are driven by how prices are set between TDD and TAEC. In this study, TAEC purchases from TDD and sells to TACP. Prof. Willig cites testimony that claims prices from TDD to TAEC are a function of the price TAEC charges TACP;³⁴⁰ based on this, Prof. Willig claims the results for TAEC are uninformative.³⁴¹ His conclusion, however, is based on the assumption that cost changes are somehow not relevant for determining the price that TAEC charges TACP, which is incorrect; in fact, employees of TAEC and Toshiba Corporation testified to the contrary.³⁴² Given that costs are clearly a

³³⁹ These data contain approximately 6,600 units of a Compaq LCD monitor with a model listed as "PRESARIOFX50." Hewlett-Packard, Undated, Comparison Chart Between HP Pavilion and Compaq Presario Flat Panel Monitors, https://h10025.www1.hp.com/ewfrf/wc/document?docname=c00284464&tmp_task=useCategory&cc=us&dlc=el&c=en&os=1&product=57763&sw_lang=#c00284464_FX50, accessed 08 January 2013, p. 3.

³⁴⁰ Prof. Willig cites to the Deposition of Jay Heinecke from TAEC, who claims the price from TDD to TAEC is based on TAEC's sales price minus a small, predetermined margin. Willig Report, ¶144, ¶176, and 31 July 2012, Deposition of Toshiba America Electronics Corporation 30(b)(6) Witness Jay Alan Heinecke (Hereinafter "Toshiba 30(b)(6) Jay Alan Heinecke Deposition, 31 July 2012"), pp. 100, 240-242.

³⁴¹ Willig Report, ¶144.

³⁴² See, e.g.,

- Jay Heinecke of TAEC testified, "Q. Okay. So in that scenario, we want to focus in now on the quoted price that you would provide back to them, and let me ask you, how is it that you as a company, TAEC, was able to make a decision as to what price to quote? A: We looked at a variety of variables when we quoted pricing. First of all, was our product unique in the marketplace, and what were, you know, obviously the features that I talked about earlier. What was our perceived value of those features, and then we would also talk to the factory side as far as, okay, is your factory full? Is it not full? Is this a highly desirable product for you? And of course they would also look at their cost structure and where they believed the cost of the tube would be at, and then between that and any other market information that we would see out in the market place as far as TVs were concerned that could have any viable impact on what we were selling, took that in consideration, and that's how we came up with a price. It was a variety of different factors, variables." Toshiba 30(b)(6) Jay Alan Heinecke Deposition, 31 July 2012, pp. 110:15 - 111:16.
- From Toshiba Corporation 30(b)6 testimony, "Q. Okay. And so -- fair enough. But how about pricing? Who was involved in the pricing decisions? A. As I was saying, in order to discuss the specification of the product and the anticipated volume, the purchasing people and engineers from the customer's side would get together with our salespeople and our engineers. And once there was some fairly solidified notion as to the specification and the volume, then there would be discussions between their purchasing and our salespeople, and we would take that information back to Toshiba and discuss it internally. Our salespeople

determinant in how TAEC sets price, the testimony Prof. Willig cites, if accurate, would merely establish that pass-through of at least 100% is guaranteed in the transfer of products from TDD to TAEC.^{343,344}

XIII. Appendix B: Prof. Willig's pass-through analyses and evidence premised on the incorrect experiment

Below are specific examples of evidence presented by Prof. Willig that are premised on the incorrect questions and, therefore, are uninformative anecdotes from which one cannot assess whether the alleged cartel overcharges were passed-through the distribution channel, ultimately resulting in increased prices for CRT products to class members.

would have this information that they got back from the customer, and they would have discussions with the factory to determine who was going to be making this product. And then on the basis of the results of those conversations, sales would go back to the customer and start negotiating prices. As for who was going to make the final pricing decision, sometimes that would be the senior manager of sales or it could be the general manager or even the company president. Q. And what types of things did Toshiba look at to make a determination as to what price to charge for the CRTs that it was attempting to sell? A. There would be a proposed price from the customer. There would also be information from the factory as to how much it would cost to make. There'd be various elements." 30 July 2012, Deposition of Toshiba Corporation 30(b)(6) Witness Koji Kurosawa (Hereinafter, "Toshiba 30(b)(6) Koji Kurosawa Deposition, 30 July 2012"), p. 85:6-10.

³⁴³ Prof. Willig makes the same argument regarding sales between various Panasonic entities as well, "This type of approach to setting PAVCA's sales prices implies that upstream prices of their TVs were at least partly driven by downstream prices." Willig Report, footnote 130.

³⁴⁴ Prof. Willig cites to similar testimony that he claims disrupts the link between prices product manufactures charge to related entities; this testimony is also misleading. Specifically, he claims a decline in the demand for CRT TVs and monitors exerted pressure on product manufacturers to reduce the wholesale prices for finished CRT products. Prof. Willig uses an example of Panasonic entities PAVCA, a finished product manufacturer, and PNA, a distributor of Panasonic products in North America. According to the testimony of a representative of PAVCA, the ex-factory price PAVCA charged PNA was based on the market price PNA negotiated with its customers rather than material costs. However, a representative of PNA testified that prior to beginning negotiations with retailers PNA would negotiate the start price with the factory. Edwin Wolff of PNA testified that prior to beginning negotiations with retailers PNA would negotiate the start price with the factory, "Q. How did you set the price when you were in that position? A. We would -- it usually started with a conversation about the line with our accounts. So we would go to a Best Buy, a Sears, pick a retailer, and say here's our plans for the line, here's the pricing we're thinking about, how does it fit with what your knowledge of the market is. We would either -- I mean they may say it's high, it's low, it looks fine. It depended on the features that we built into the sets. We would use that information to try to achieve those prices that the dealer required. That's really what it was. Q. When you started this conversation -- A. Uh-huh. Q. -- about the line with your accounts, did you take into consideration the amount -- the cost of producing that good? A. No. Q. When you -- let me start over. So when you established a price -- A. Uh-huh. Q. -- did you have to have that price approved by anybody else within Panasonic? A. Approved? No. I mean, I had other people that I would discuss it with. I would negotiate with the factory and make them understand that in order for us to achieve a certain level of sales, we would need to have this price in the market or we wouldn't get it placed. Once that was done, the factory said, yes, we could do it, I would use that as the price to start with. We had certain things we knew we had to achieve. We always had to make sure we were below Sony because, frankly, they were the dominant market leader in the TV business and we really couldn't -- we really had to start understanding that there was a certain price level for Sony and we had to be within a certain level against Sony in order to be successful. And we would look at other what we call tier 1 brands and see what their pricing offers were, and we would have to be in that area." 18 July 2012, Deposition of Panasonic North America 30(b)(6) Witness Edwin Wolff at 18:16 - 20:6.

A. Testimonial evidence cited does not contradict my finding of pass-through at 100% or more

In Section VIII.G above, I explain why the DAP complaints cited by Prof. Willig do not, in fact, support his claim that pass-through may not occur. Specifically, the evidence he cites is premised on the incorrect question. Defendants' cite similarly incomplete and otherwise insufficient evidence from reseller depositions to support their claims. Defendants have elicited testimony from Best Buy and Costco representatives that is both misleading and inappropriate. This testimony is misleading in the following ways:

- Defendants present a considerable amount of testimony that is not informative of pass-through.³⁴⁵ Specifically, this testimony merely establishes that price levels across CRT products may be differentiated across retailers, products, and time, and that month-to-month changes in price levels are differentiated. However, as I explain in Section XIV.B, price levels alone are not informative to pass-through: to measure pass-through, one must have information about both cost changes and price changes;³⁴⁶ price levels alone are insufficient to make inferences regarding how cost changes were (or were not) passed through the distribution channel.
- Defendants cite testimony that negotiated prices, volume and other discounts, bundled products, loyalty programs, and other similar arrangements lead to different customers paying different prices.³⁴⁷ As I explain above, price dispersion is not informative for

³⁴⁵ Defendants Memo in Opp. repeatedly cites testimony from Best Buy and Costco related to price levels, price setting, and other related topics that are uninformative for pass-through. See, e.g.,

- Memo in Opp., p. 4, citing to 03 December 2012, Deposition of Best Buy Co. 30(b)(6) Witness Brian Stone (Hereinafter "Best Buy Co. 30(b)(6) Brian Stone Deposition, 03 December 2012"), pp. 97:24-98:6.
- Memo in Opp., pp. 13-14, citing to Best Buy Co. 30(b)(6) Brian Stone Deposition, 03 December 2012, pp. 77:13-78:20 and 157:21-158:8.
- Memo in Opp., p. 17 and 22, citing to Best Buy Co. 30(b)(6) Brian Stone Deposition, 03 December 2012, pp. 97:24-99:1.

³⁴⁶ Prof. Willig acknowledges that cost changes and price changes are necessary inputs for measuring pass-through. See footnote 364.

³⁴⁷ Defendants Memo in Opp. cites the following testimony from Best Buy and Costco:

- Memo in Opp., p. 4, citing to Best Buy Co. 30(b)(6) Brian Stone Deposition, 03 December 2012, pp. 97:24-98:6.
- Memo in Opp., p. 14, citing to Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 47:12-15.
- Memo in Opp., p. 22, citing to Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 53:10-56:17, 85:1-86:5, and 105:12-24.
- Memo in Opp., p. 27. Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 114:16-116:25.
- Memo in Opp., pp. 22 and 17-19, citing to Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, p. 125:5-17.
- Defendants cite testimony regarding negotiated prices that is not only irrelevant, but misleading as well. Defendants claim that Best Buy store managers "had discretion to negotiate prices with individual consumers to 'close [the] sale'." Memo in Opp., p. 15 and Best Buy Co. 30(b)(6) Brian Stone Deposition,

pass-through; furthermore, all of these same pricing influences would be present in the but-for world as well. That is, absent the alleged cartel overcharge, certain customers would still negotiate or receive volume discounts; however, the base price from which any discount is applied would be lower. As such, these issues do not present examples in which pass-through may not have occurred.³⁴⁸

- Most of Defendants claims regarding pass-through ask the wrong question. That is, they are asking the deponent how the firm would respond to cost changes that are not comparable to the cartel overcharges.³⁴⁹ As such, these responses are not informative; in fact, when the questions are appropriately framed, the deponent provides a different answer. Specifically, Defendants claim Costco testified that pass-through varies on a case-by-case basis and there were instances in which Costco could not achieve pass-through at all.³⁵⁰ However, Defendants fail to mention that this testimony is specifically referring to a 1% cost increase and the Deponent indicated a larger cost increase would likely require a price adjustment.³⁵¹ Furthermore, the Deponent later clarified this testimony when asked how Costco would respond to a significant, permanent, and industry-wide cost change, stating: “Well, if it’s an item that we’re going to continue to purchase at the higher cost, at some point we’re going to have to make an adjustment.”³⁵²
- Defendants cite several instances in which the Deponent states that competition precludes pass-through.³⁵³ These quotes, however, are not evidence that the cartel overcharges

03 December 2012, pp. 102:15-103:6. However, the deponent later clarified this testimony, “Q. Okay. I want to ask you a couple questions about negotiating prices. We talked a little bit about that earlier, and I just want to, first of all, get a sense, to make sure that we’re all in the same page, about what we -- what you meant when you said negotiate prices. Can -- can I walk into a Best Buy store and say, I see you got this thing for -- this TV for a hundred bucks, I’ll give you ninety for it? Is that what you meant, or did you mean something else when we were talking about negotiating? A. To be clear, I -- my response was not thinking about that example that you just listed, of coming into a Best Buy store and offering a different price than what’s displayed from the shelf. My belief of how I was referencing negotiating would be if I’m a consumer, I see that in the same parking lot you have a Comp U.S.A. or a Circuit City and a Best Buy. My ability to go from the Circuit City to the Comp U.S.A. to the Best Buy is a matter of a three-minute walk.” Best Buy Co. 30(b)(6) Brian Stone Deposition, 03 December 2012, pp. 185:5 - 186:5.

³⁴⁸ In Section VIII.C.4 of my Original Report I address this same issue.

³⁴⁹ See, e.g.,

- Defendants claim that factors such as whether the product was new or refurbished or where a product was in its lifecycle would impact pricing. Memo in Opp., p. 15 and Best Buy Co. 30(b)(6) Brian Stone Deposition, 03 December 2012, pp. 97:24-99:1. Refurbished products are not relevant for assessing whether the cartel overcharge would be passed-through. Furthermore, products at the end of their life that may have decreasing prices are similarly uninformative to whether pass-through occurs: first, these products are not representative of the overwhelming majority of items sold; second, a given product would be at the same point in its lifespan in the but-for world as well, which would have the same impact on pricing.

³⁵⁰ Memo in Opp., pp. 17-18 and 27, citing to Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 106:4-14.

³⁵¹ Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 109:1-110:21.

³⁵² Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 122:15-124:5.

³⁵³ See, e.g.,

would not be passed-through; this testimony is merely evidence that each and every cost change is not passed-through. As I explain in Section VIII.D, competition forces resellers to pass-through significant, permanent, and industry-wide cost changes, but at the same time, competition also precludes pass-through if any one of these criteria is not present.

Contrary to Defendants' assertions, the reseller testimony does not support their claims regarding the inability of those firms to pass-through the cartel overcharges. Defendants' conclusions rely on testimony that is uninformative regarding pass-through rates or that is responsive to conditions that are not analogous to the cartel overcharges.

B. Examples of “de-linked” prices and costs

Prof. Willig presents a few selected examples of products for which he claims decisions about prices and costs are “de-linked”. These analyses suffer specific faults which are described below, but more importantly these analyses are entirely misguided. That is, the overcharges in question in this matter are not comparable to the cherry-picked example of cost changes that Prof. Willig examines for these analyses.

1. Zones³⁵⁴

Prof. Willig examined specific cost changes in the Zones data to determine whether the “pass-through rate applied uniformly to all CRT monitors that Zones sold throughout the class period”.³⁵⁵ His analysis is flawed for the following reasons:

- This analysis includes no information on the number of units represented in each of the “cost change events” defined by Prof. Willig.³⁵⁶
- He uses monthly average prices and costs, which may confound his analysis if pass-through is not immediate. For example, if costs increase in late February but prices do not increase until early March, his analysis would show an increasing monthly average cost for February, but prices would stay constant for that month. Based on this information, his analysis would conclude that Zones did not change prices in response to this cost

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- Memo in Opp., p. 15, citing to Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 25:7-23 and 31:6-32:6.
 - Memo in Opp., pp. 17-18, citing to Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp. 109:1-110:21.
 - Memo in Opp., pp. 27, citing to Costco 30(b)(6) Geoffrey Shavey Deposition, 07 December 2012, pp.114:16-116:25.

³⁵⁴ Zones is an online retailer that sells to individuals and businesses. “Zones is a national provider of IT products and solutions to businesses. We work closely with business clients and organizations of all sizes and types, including Healthcare, Fortune 1000 companies and public-sector accounts.” Zones, Undated, About Zones, http://www.zones.com/site/statics/static_page.html?name=corporate/about-us/corporate-info-main, accessed 22 October 2012 at 1.

³⁵⁵ Willig Report, ¶124 and Exhibit 24A.

³⁵⁶ “I consider only instances in which Zones’ (weighted average) procurement cost for a model changed by at least 5% and its procurement cost for that model did not change by a similar magnitude in the previous or following month.” Willig Report, footnote 118.

change, which is false. Further confounding this problem, in March his analysis would show a constant average cost, but prices would increase.³⁵⁷

- This analysis drops months in which there are consecutive cost change events.³⁵⁸ This condition necessarily excludes some cost changes that are likely to be most comparable to the cartel overcharges. That is, this criterion drops significant cost changes, which are the ones that are more comparable to the cartel overcharges as well as those that Zones is more likely to respond to by changing prices.
- Prof. Willig's identification of cost change events compares the change in cost to the lifetime average cost for the product.³⁵⁹ That is, his cost change events do not look at month-to-month cost changes, which may be what resellers are considering when determining how to set prices. Prof. Willig's use of lifetime average cost in this analysis is inconsistent with his claims regarding the Best Buy data. Specifically, he claims lifetime average costs do not provide a reliable measure of cost for Best Buy and, therefore, does not use those data for a pass-through study.³⁶⁰ It is unclear why he considers lifetime average cost an uninformative measure for the Best Buy study, while in this analysis he considers them valid.

2. TACP

Prof. Willig presents another example of what he claims are “de-linked cost and price decisions”³⁶¹ based on sales of single TV model in the TACP data. This single product represents approximately 0.05% of the data,³⁶² and Prof. Willig provides no justification that this product is representative of TACP's overall pricing decisions.³⁶³ In short, this specific analysis merely

³⁵⁷ My regression analysis is based on the full Zones dataset and, therefore, includes these potential timing differences. The result would be to increase the standard error of my pass-through estimate. Because the overwhelming pattern in the data is that cost changes are passed through, even with this timing noise my estimates of the pass-through rate are very precisely estimated.

³⁵⁸ See Footnote 356.

³⁵⁹ This is calculated as (current month's cost - previous month's cost) / (average cost).

³⁶⁰ “Best Buy: Based on information received on December 11, 2012, the average unit cost that is included in Best Buy's synchronized sales data is calculated over all units of the product that Best Buy purchased prior to the date of the sale. That is, the average cost represents an average taken over the entire life of the product, regardless of how many units are left in the inventory at the time of the sale. As a result, Best Buy's average cost field does not represent a consistent or reliable measure of the procurement cost for the product sold in a given transaction, particularly since the wholesale prices of CRT products tended to decrease over time.” Willig Report, ¶ 176.

³⁶¹ Willig Report, ¶125.

³⁶² TACP sold 11,519 units of this product out of approximately 22 million total units reflected in TACP's data.

³⁶³ In fact, during deposition Prof. Willig cautions about relying on what he refers to as “extreme cases” that may be data anomalies. See, e.g.,

- “But that's why we use percentages across a bigger sample, so that that [sic] kind of anomaly averages out in the data even when it does occur.” Willig Dep., p. 153:14-18.
- “And I thought it was a good idea to do that robustness test, although I don't think it's essential, because, again, you can always find exceptions to what's more ordinarily the case, sort of middle-of-the-month things or things that extend in their effect across a broader part of the month than our sample suggests.

provides anecdotal evidence based on a single product cherry-picked from TACP's transactional data.

XIV. Appendix C: Analyses by Prof. Willig that do not contain the requisite information to measure pass-through

A. Prof. Willig's finished goods price graphs are misleading

Prof. Willig's Exhibit 1B includes four graphs of prices for finished CRT products sold at four different retailers; these graphs are misleading for the following reasons:

- He includes prices for all CRT products. For example, in the same month (May 2003), the Best Buy graph includes a price of \$1,799.99 for a 36-inch high-definition Sony CRT television (Best Buy SKU number 5446984) and a price of \$79.99 for a 13-inch round tube CRT television from Philips (Best Buy SKU number 5323562). Obviously, these are very different products that one would expect to be sold at very different prices; it is not surprising or informative that these products are sold at different prices.
- Prof. Willig provides no measure of how many items are sold at each price point. For example, consider these two scenarios: 1) the price of a given product ranged from \$100 to \$1,000; and 2) 5,000 units of this product was sold at \$1,000, while only one unit was sold at \$100. These two points would appear identically in Prof. Willig's Exhibit 1B. Despite having quantity information available, Prof. Willig's exhibit only indicates individual prices and, without a consideration of the quantity of products sold at each price, are not particularly informative of the prices that class members paid for any given product.

Examining specific products from the Best Buy data illustrates why these graphs are misleading. Exhibit 35 graphs the monthly unit-weighted average prices at which a Sharp 32 inch TV was sold; unlike Prof. Willig's charts, though, this exhibit also shows the units sold at each price level. Although there is some minor variation in monthly prices over time, the general trend of prices decreasing over the product's lifespan is evident. By May 2004, approximately 99% of these products had been sold; after this point, the prices fluctuate wildly. These latter data points represent a trivial number of products and are not indicative of the true price points at which nearly all of these products were sold. Prof. Willig's graphs obscure these facts and simply graph all prices, for all products, over the entire period.

B. Prof. Willig's finished goods price graphs are not relevant

Putting aside the problems explained above regarding the accuracy of these graphs, price levels and/or the degree of price dispersion on their own are not informative of the pass-through rate. Pass-through refers to how changes in upstream *costs* lead to changes in downstream *prices*; therefore, any analysis that only considers price simply cannot be used to make inferences regarding how cost changes were (or were not) passed through the distribution channel.³⁶⁴ Prof.

Since these are percentages over bigger samples, I'm not worried about the fact that there could be extreme cases that this doesn't catch." Willig Dep., p. 154: 7-18.

³⁶⁴ Prof. Willig, when asked to define pass-through, acknowledges that pass-through involves changes in cost and price. He states, "Suppose we've got a firm and it's in its own market setting, and it experiences a change in its

Willig presents several related analyses, from which he claims that different prices make it unlikely that pass-through rates were uniform across all CRT finished products.

- Prof. Willig shows that two resellers offer the same items at different prices; see Willig Exhibit 20. He notes that the prices range between \$123 and \$160 for Ingram Micro and between \$135 and \$150 for PC Connection.³⁶⁵ As previously explained, selling to different customers at different prices is neither surprising nor is it indicative that pass-through does not occur.³⁶⁶
- Prof. Willig calculates price-cost margins for Ingram Micro and PC Connection; see Willig Exhibits 21-22. These charts are again misleading and irrelevant: pass-through examines cost and price changes and is not a function of the price-to-cost margin. In other words, pass-through is entirely consistent with margins of less than 1.0, which I explained in Section VIII.C.4.b) of my original report.
- Prof. Willig also argues that changes in prices of CRT finished products were also differentiated;³⁶⁷ however, knowing that the prices for some products declined, while others did not, says nothing about pass-through without corresponding cost information. The information that he has presented is completely devoid of the accompanying cost change information and is, therefore, non-informative for pass-through. In addition, his analysis is misleading because he provides no information on the quantity of products sold, but rather cites the percentage of price changes without incorporating the quantity sold at each price.

C. Plaintiff Steve Ganz's purchase

Prof. Willig presents the purchase of a 27" Toshiba TV for \$329.99 by one named plaintiff, Steve Ganz, as support for his claim that prices are differentiated. His claims are also misleading and irrelevant. To support his claim that finished CRT products varied in price he writes, "in the same month, Best Buy sold 27" Toshiba CRT TVs at prices ranging from \$25 to \$719.99. About 34% of the 27" Toshiba televisions Best Buy sold in May 2005 were priced below \$250 and 17%

costs. The word 'pass-through' is used to describe, at least in some applications, what the impact is on the pricing of that firm due to that increase in its costs. And so one might say, oh, those costs are pass-through or they're not pass-through or they're influencing prices in some way that may not be similar or identical in the form but nevertheless there may be some impact on pricing due to the change in costs. So the word 'pass-through' I think is generally used for that kind of situation." Willig Dep., pp. 35:25-36:17.

³⁶⁵ Prof. Willig mistakenly claims that Ingram Micro and PC Connection both sell to end users. PC Connection is a retailer and does sell to end users, but Ingram Micro is a distributor that does not sell to individual end users.

³⁶⁶ I discuss this in Section VIII.C.4.a) of my Original Report.

³⁶⁷ See, e.g.,

- Willig Report, ¶47 (updated in Errata) and Exhibit ER-2B.
- "in 128 of the 152 months in the class period, at least 20% of retail CRT finished product prices declined (month-over-month) by 5% or more while at least 20% of TV and monitor prices were flat." Willig Report, ¶119 (updated in Errata).

were priced above \$400.”³⁶⁸ This is misleading because he is inappropriately comparing all 27" Toshiba CRT TVs sold at Best Buy during that month:

- Prof. Willig provides no information as to what type of 27" TV Mr. Ganz purchased or what other types of 27" TVs were sold by Best Buy. Examining the Best Buy data shows there are three distinct price points for 27" TVs: round tube TVs sell for approximately \$225; flat tube TVs sell for approximately \$330; and flat tube TVs with DVD/VCR combos sell for approximately \$430. Examining each of these types of 27" TVs, it becomes clear that there is very little price variation for comparable products, contrary to his claims.³⁶⁹
- Furthermore, examining the specific product that Mr. Ganz purchased, Best Buy SKU number 7027415, again shows very little price variation.³⁷⁰ Mr. Ganz paid \$329.99 for this product, which is the identical price at which 57% of the total units for this SKU were sold in May 2005; another 32% were sold at \$312.99 in the same month. See Exhibit 36.

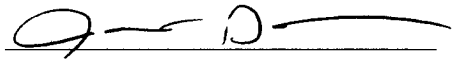
There is actually very little price variation for the specific product purchased by Mr. Ganz; the range of prices cited by Prof. Willig includes products that are not comparable as well as a handful of outliers that are not informative to the actual price at which these products were sold.

³⁶⁸ Willig Report, ¶¶19 and 45.

³⁶⁹ Additionally, the figures cited by Prof. Willig, \$25 and \$720, are clearly outliers in these data. They are precisely what he refers to as “extreme cases” that are not representative of the entire dataset; see Footnote 269.

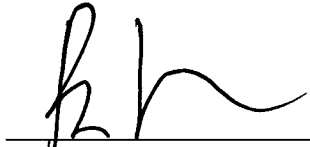
³⁷⁰ Mr. Ganz’s original purchase receipt indicates that he purchased a product with the Best Buy SKU number 7027415. See 02 May 2005, Best Buy Receipt for Steve Ganz, <<Ganz Best Buy Receipt.pdf>>.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief. This declaration was executed on the 15th day of February 2013, at Ann Arbor, Michigan.



JANET S. NETZ

Subscribed and sworn to before me this 15th day of February 2013.



Notary Public

BRIAN PAUL ROSEWARNE Notary Public, State of Michigan County of Washtenaw My Commission Expires May. 20, 2014 Acting in the County of _____

My commission expires: _____



Dr. Janet S. Netz

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M.A. economics, University of Michigan, 1990
B.A. economics, University of California at Berkeley, 1986, *cum laude*

Employment

Founder and Partner, applEcon, May 2001 to present
Visiting Associate Professor, University of Michigan, Fall 2001, Fall 2002, Fall 2003
Associate Professor, Purdue University, Fall 2001 to January 2003
Visiting Assistant Professor, University of Michigan, Winter 2001
Assistant Professor, Purdue University, Fall 1994 to Spring 2001
Assistant Professor, University of Delaware, Fall 1992 to Summer 1994

Courses Taught

Industrial Organization (undergraduate and doctoral)
Antitrust and Regulation (undergraduate)
Intermediate Microeconomics (undergraduate and master's)
Microeconomic Principles (undergraduate)
International Economics (undergraduate and master's)

Publications

"Are All Men's College Basketball Players Exploited?", with Erin Lane and Juan Nagel, *Journal of Sports Economics*, 2012 (forthcoming).

"Price Regulation: Theory and Performance", in *Regulation and Economics*, Roger J. Van den Bergh and Alessio M. Paccas, eds., Edward Elgar Publishing, 2011.

"Sports Trivia: A Review of The Economics of Intercollegiate Sports by Randy R. Grant, John Leadley, and Zenon Zygmunt", *Journal of Economic Literature*, 47(2), June 2009, 485-489.

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"International Integration and Growth: A Survey and Empirical Investigation", with Vivian Lei and Jon D. Haveman, *Review of Development Economics*, 5(2), June 2001.

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"Exercising Market Power in Proprietary Aftermarkets," with Severin Borenstein and Jeffrey K. MacKie-Mason, *Journal of Economic and Management Strategy*, 9(2), Summer 2000, 157-188.

"All in the Family: Family, Income, and Labor Force Attachment", with Jon D. Haveman, *Feminist Economics*, 5(3), November 1999, 85-106.

"Why Do All Flights Leave at 8am?: Competition and Departure-Time Differentiation in Airline Markets", with Severin Borenstein, *International Journal of Industrial Organization*, 17(5), July 1999, 611-640.

"An Empirical Test of the Effect of Basis Risk on Cash Market Positions", *Journal of Futures Markets*, 16(3), 289-312, May 1996.

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"The Economics of Customer Lock-In and Market Power in Services", with Severin Borenstein and Jeffrey K. MacKie-Mason, in *The Service Productivity and Quality Challenge*, Patrick T. Harker, ed., Kluwer Academic, 1994.

Working Papers and Work in Progress

"Fantasy Football Points as a Measure of Performance", with Erin Lane and Juan Nagel

"Non-Profits and Price-Fixing: The Case of the Ivy League"

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle"

"Basis and Exchange Rate Risks and their Impact on Storage and Exports"

Research Grants and Awards

"Cooperation and Competition Among Nonprofits", Nonprofit Sector Research Fund, Aspen Institute, 2000.

"Product Customization and Product-Space Positioning", Dauch Center for the Management of Manufacturing Enterprises, Summer 2000.

"Outstanding Economics Professor of the Year", Economics Club, Purdue University, 1999.

"Trade Barriers, Trade Blocs, Growth, and Convergence", Purdue Research Foundation, 1998-1999.

"Effects of Informational Asymmetry on Competition in the Residential Long Distance Calling Market", Purdue Research Foundation, 1997-1998.

"Basis and Exchange Rate Risks and their Impact on Storage and Exports", Center for International Business and Economic Research, Summer 1997.

Global Initiative Faculty Grant (Course Development), "Industrial Organization in an International Marketplace", Purdue University, Summer 1997.

"Trade, Not Aid", Purdue Research Foundation, Summer 1996.

"Trade, Not Aid", Center for International Business and Economic Research, Summer 1996.

"The Effect of Price-Fixing by Institutions of Higher Education", Purdue Research Foundation, Summer 1995.

"Applied Microeconomics/International Workshop", Purdue University, Spring 1995.

"The Market Structure of Higher Education", University of Delaware, Summer 1993.

Research Associate, Center for the Study of Futures Markets, Columbia University, 1991.

Rackham Merit Fellowship, University of Michigan, 1987-1989.

Chancellor's Scholar, University of California at Berkeley, 1983-1986.

Referee

American Economic Review
Feminist Economics
International Journal of the Economics of Business
International Journal of Industrial Organization
Journal of Economic Education
Journal of Economic and Management Strategy
Journal of Family and Economic Issues
Journal of Futures Markets
Journal of Industrial Economics
Journal of Law and Economics
Journal of Law, Economics, and Organization
Management Science
Review of Economics and Statistics
Scandinavian Journal of Economics
Telecommunications Systems

Conference and Workshop Presentations

Panel participant, "Preparing Early and Often", State-of-the-Art Strategies for Managing Class Action Experts, American Bar Association, 16th Annual National Institute on Class Actions, Chicago, IL, October 2012.

Panel participant, "Hot Topics Involving Experts in Antitrust Litigation", New York State Bar Association, Antitrust Law Section, Annual Meeting, New York, NY, January 2011.

Guest lecturer, Alternative Dispute Resolution Practicum, University of Michigan Law School, April 2008.

"The Economics of Indirect Purchaser Cases", State Bar of Arizona Annual Conference, Phoenix, AZ, June 2004.

"Manipulating Interface Standards as an Anti-Competitive Strategy", Standards and Public Policy Conference, Federal Reserve Bank of Chicago, Chicago, IL, May 2004.

"One-Way Standards as an Anti-Competitive Strategy", Telecommunications Policy Research Conference, Alexandria, VA, September 2002.

"Product Proliferation and Product Space Location", Econometric Society Meetings, New Orleans, January 2001.

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle", American Economics Association Meetings, New Orleans, January 2001.

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle", Indiana University-Purdue University Indianapolis, November 2000.

"Maximum or Minimum Differentiation? An Empirical Investigation into the Location of Firms", University of British Columbia, March 2000.

"Non-Profits and Price-Fixing: The Case of the Ivy League", University of Illinois, October 1999.

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle", Baylor University, September 1999.

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle", Western Economic Association Meetings, San Diego, July 1999.

"Non-Profits and Price-Fixing: The Case of the Ivy League", University of Chicago, April 1999.

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"International Integration and Growth: A Survey and Empirical Investigation", Dynamics, Economic Growth, and International Trade, III, Taiwan, August 1998.

Discussant ("Fiscal Policy and International Demand Spillovers"), Dynamics, Economic Growth, and International Trade, III, An International Conference, Taiwan, August 1998.

"International Integration and Growth", Workshop on Empirical Research in International Trade and Investment, Copenhagen, June 1998.

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"Non-Profits and Price-Fixing: The Case of the Ivy League", Department of Justice Antitrust Division, April 1998.

"Non-Profits and Price-Fixing: The Case of the Ivy League", American Economics Association Meetings, Chicago, January 1998.

Discussant ("Equilibrium under Satisficing," by Ralph W. Pfouts), International Atlantic Economics Society, ASSA Meetings, Chicago, January 1998.

Discussant ("Overseas Investments and Firm Exports," by Keith Head and John Ries), Fourth Annual Empirical Investigations in International Trade conference, Purdue University, November 1997.

"Maximum or Minimum Differentiation? An Empirical Investigation into the Location of Firms", International Atlantic Economic Association Conference, Philadelphia, October 1997.

Discussant ("Antidumping Enforcement in a Reciprocal Model of Dumping: Theory and Evidence," Taiji Furusawa and Thomas J. Prusa) and session chair, Third Annual Empirical Investigations in International Trade conference, Purdue University, November 1996.

"The Effect of Price-Fixing by Institutions of Higher Education", Indiana University-Purdue University Indianapolis, April 1996.

"Exercising Market Power in Proprietary Aftermarkets", with Severin Borenstein and Jeffrey K. MacKie-Mason, Indiana University - Purdue University - IUPUI First Tri-School Conference, March 1996.

"All in the Family: Family, Income, and Labor Force Attachment", with Jon D. Haveman, American Economic Association Meetings, San Francisco, January 1996.

"Family Matters: Unemployment, Wage Changes, and Mobility", with Jon D. Haveman, Southern Economics Association Meetings, New Orleans, November 1995.

Discussant and session chair, Second Annual Empirical Investigations in International Trade conference, Purdue University, November 1995.

"Competition and Anti-Competitive Behavior", ICLE (The State Bar of Michigan) Conference on Antitrust and Intellectual Property, July 1995.

"Price-Fixing, Tuition, and Financial Aid", Midwest Economics Association Meetings, Cincinnati, April 1995.

"Family Matters: Unemployment, Wage Changes, and Mobility," Midwest Economics Association Meetings, Cincinnati, April 1995.

Discussant and session chair, "Customer Discrimination, Entrepreneurial Decisions, and Investment", Midwest Economics Association Meetings, April 1995.

"An Empirical Test of the Effect of Basis Risk on Cash Market Positions", University of Illinois, Urbana-Champaign, February 1995.

Discussant and session chair, First Annual Empirical Investigations in International Trade conference, Purdue University, November 1994.

"Antitrust Policy in Aftermarkets", with Severin Borenstein and Jeffrey K. MacKie-Mason, FTC/DOJ/ABA Conference on Post-Chicago Economics, Washington, D.C., May 1994.

"The Effect of Price-Fixing by Institutions of Higher Education, University of Delaware, May 1994.

"The Effect of Futures Markets and Corners on Storage and Spot Price Variability", Purdue University, February 1994.

"An Empirical Test of the Effect of Basis Risk on Cash Market Positions", University of California at Davis, February 1993.

Discussant, Econometrics Association, Anaheim, 1992 Annual Meetings.

"Testing the Principle of Minimum Differentiation: Airline Departure-Time Crowding", Econometrics Association, Washington, D.C., 1990 Annual Meetings.

Consulting and Testifying

In re Cathode Ray Tube (CRT) Antitrust Litigation

United States District Court, Northern District of California, San Francisco Division, No. CV-07-5944-SC

Testifying expert for plaintiffs

Deposed November 2012

In re Photochromic Lens Antitrust Litigation, 2010-2012

United States District Court Middle District of Florida, Tampa Division, No. 8:10-md-02173-JDW-EAJ

Testifying expert for plaintiffs

Deposed August 2012

Datel Holdings and Datel Design and Development v. Microsoft, 2010-2011

United States District Court, Northern District of California, San Francisco Division, No. 09-cv-05535

Testifying expert for plaintiffs

Deposed October 2011

In re Prefilled Propane Tank Marketing and Sales Practices Litigation, 2010-2011

United States District Court, Western District of Missouri, Western Division, No. 4:09-cv-00465

Testifying expert for plaintiffs

In re Florida Cement and Concrete Antitrust Litigation, 2010

United States District Court, Southern District of Florida, Miami Division, No. 1:09-cv-23493-CMA

Consulting expert for plaintiffs

Altair Engineering v. MSC Software, 2009-2010

United States District Court, Eastern District of Michigan, Southern Division, No. 2:07-cv-12807

Testifying expert for plaintiffs

Deposed May 2010

In re Optical Disk Drive products Antitrust Litigation, 2009-2010

United States District Court, Northern District of California, San Francisco Division, No. M:2010-cv-02143

Consulting expert for plaintiffs

In re Flash Memory Antitrust Litigation, 2008-2011

United States District Court, Northern District of California, Oakland Division, No. C-07-0086-SBA

Testifying expert for plaintiffs

Deposed August 2009

Valassis Communications, Inc. v. News America, Inc., 2008-2009

United States District Court, Eastern District of Michigan, Southern Division, No. 2:06-cv-10240

Circuit Court of the State of Michigan, County of Wayne, No. 07-0706645-CZ

Consulting expert for plaintiffs

In re TFT-LCD (Flat Panel) Antitrust Litigation, 2008-present
United States District Court, Northern District of California, San Francisco Division, No. M:07-cv-01827
Testifying expert for plaintiffs
Deposed July 2009, June 2010, June 2011, August 2011

Houston Baptist University v. NCAA, 2008-2009
United States District Court in and for the Southern District of Texas, Houston Division
Testifying expert for plaintiffs

Seoul Semiconductor Co. v. Nichia Corp., 2008
United States District Court, Northern District of California, No. 3:08-cv-04932-PJH
Testifying expert for plaintiffs

Albert Andy Cohn v. Office Depot, 2008
Superior Court of the State of California, County of Los Angeles, Central District, No. BC 372449
Testifying expert for defendants

In re Graphics Processing Units Antitrust Litigation, 2007-2008
United States District Court Northern District of California, No. M:07-CV-01826-WHA
Testifying expert for plaintiffs
Deposed June 2008

Pro-Sys Consultants Ltd. and Neil Godfrey v. Microsoft, 2007-present
Supreme Court of British Columbia, No. L043175, Vancouver Registry
Testifying expert for plaintiffs
Deposed December 2008

In re Dynamic Random Access Memory (DRAM) Antitrust Litigation, 2007
United States District Court, Northern District of California, No. 02-cv-01486
Consulting expert for plaintiffs

Jason White et al. v. NCAA, 2006-2008
United States District Court Central District of California, No. CV 06-0999 RGK (MANx)
Testifying expert for plaintiffs
Deposed October 2007

Kleppner et al. v. Unocal, 2004-2008
In re Reformulated Gasoline (RFG) Antitrust and Patent Litigation
United States District Court Central District of California, No. 05-1671 CAS
Testifying expert for plaintiffs
Deposed December 2006

Carlisle, settlement negotiations with Crompton, EPDM price-fixing cartel, 2005-2007
Consulting expert

Caterpillar and Carlisle, settlement negotiations with DuPont-Dow Elastomers, PCP (or CR) and EPDM price-fixing cartels, 2004-2005
Consulting expert

City and County of San Francisco et al. v. Microsoft, 2004-present
United States District Court for the District of Maryland, No. 1332
Testifying expert for plaintiffs

The Service Source v. Office Depot, 2004-2005
United States District Court Eastern District of Michigan Southern Division, No. 02-73361
Project director

Joe Comes et al. v. Microsoft, 2002-2008
Iowa District Court for Polk County, No. CL82311
Testifying expert for plaintiffs
Deposed July 2006, November 2006

Charles Cox et al. v. Microsoft, 2002-2006
Supreme Court of the State of New York County of New York, No. 105193/00
Testifying expert for plaintiffs

Daniel Gordon et al. v. Microsoft, 2002-2004
State of Minnesota District Court County of Hennepin Fourth Judicial District, No. 00-5994
Testifying expert for plaintiffs
Deposed September 2003
Morelock Enterprises, Inc. v. Weyerhaeuser Co., 2004-2008
United States District Court District of Oregon, No. 3:04-cv-00583-PA
Testifying expert for plaintiffs
Deposed October 2004, April 2005, October 2007
Testified in trial April 2008

Compuware v. IBM, 2002-2005
United States District Court for the Eastern District of Michigan, No. 02-70906
Project director

Lingo et al. v. Microsoft, 1999-2004
Superior Court of the State of California City and County of San Francisco, J.C.C.P. No. 4106
Project director
In re New Mexico Indirect Purchaser Microsoft Corp. Antitrust Litigation, 2002-2004
State of New Mexico First Judicial District, No. D-0101-CV-2000-1697
Testifying expert for plaintiffs

Charles Friedman et al. v. Microsoft, 2002-2004
Superior Court of the State of Arizona in and for the County of Maricopa, No. CV2000-000722 / CV2000-005872
Testifying expert for plaintiffs
Deposed September 2003

In re Massachusetts Consumer Protection Litigation, 2003-2004
Commonwealth of Massachusetts, Superior Court Department of the Trial Court Middlesex Division, No. 00-2456
Consulting expert

Olson v. Microsoft, 2002
Montana First Judicial District Court Lewis & Clark County, No. CDV-2000-219
Consulting expert

Covad v. Bell Atlantic (Verizon), 2001-2004
United District Court for the District of Columbia, No. 99-1046
Project director

AMD, 2000-2004
Project director

Gravity et al. v. Microsoft, 1999-2003
United States District Court for the District of Columbia, No. 1:99CV00363
Staff economist

Leckrone, et al. v. Premark International, Inc., et al., 2001
Testifying expert for plaintiffs

Ren, et al. v. EMI Music Distribution, Inc., 2001
State of Michigan in the Circuit Court of the County of Macomb, No. 00-2383-CZ
Testifying expert for plaintiffs

SBC, 2000
Staff economist

City and County of San Francisco, 1999
Staff economist

Intergraph v. Intel, 1998-2001
United States District Court Appeals for the Federal District, No. 98-1308
Staff economist

Comm-Tract v. Northern Telecom, 1991-1997
United States District Court District of Massachusetts, No. 90-13088-WF
Project director

Systemcare, Inc. v. Wang Computer, 1991-1993
United States District Court for the District of Colorado, No. 89-B-1778
Staff economist

International Travel Arrangers v. Northwest Airlines, 1988-1989
Staff economist

**Exhibit B: Documents Considered in the
Expert Report of Rebuttal Declaration of Janet S. Netz, Ph. D.
Part 1: Bates Numbered Documents**

BBYCRT000080	CHWA00256935	LPD_00014598
BBYCRT000081	CHWA00256936	LPD_00028009
BBYCRT000082	CHWA00256937	LPD_00034805
BBYCRT000083	EAR_CRT00000013	LPD_00034806
BBYCRT000084	HDP-CRT00056846	LPD_00034809
BBYCRT000085	HEDUS-CRT00006153	MTPD-0283313
BBYCRT000086	HEDUS-CRT00060200	MTPD-0420756
BBYCRT000087	HEDUS-CRT00156572	MTPD-0424152
BBYCRT000088	HEDUS-CRT00183949	PHLP-CRT-024532
BBYCRT000089	KMRT-CRT00000001	PHLP-CRT-025735
BBYCRT000090	KMRT-CRT00000002	PHLP-CRT-026085
BBYCRT000091	KMRT-CRT00000003	PHLP-CRT-042025
BBYCRT000092	KMRT-CRT00000004	PHLP-CRT-059614
BBYCRT000093	KMRT-CRT00000005	PHLP-CRT-072392
BBYCRT000094	KMRT-CRT00000006	PHLP-CRT-080573
BBYCRT000095	KMRT-CRT00000007	PHLP-CRT-087483
BBYCRT000096	KMRT-CRT00000008	PHLP-CRT-130382
BBYCRT000097	KMRT-CRT00000009	PHLP-CRT-130383
BBYCRT000098	KMRT-CRT00000010	PHLP-CRT-130384
BBYCRT000099	KMRT-CRT00000011	RADS_CRT_00000002
BBYCRT000100	KMRT-CRT00000012	RADS_CRT_00000003
BBYCRT000101	KMRT-CRT00000013	RADS_CRT_00000004
BBYCRT000102	KMRT-CRT00000014	RADS_CRT_00000005
CHU00022500	KMRT-CRT00000015	RADS_CRT_00000006
CHU00022689	KMRT-CRT00000016	RADS_CRT_00000007
CHU00022701	LPD_00014554	RADS_CRT_00000008
CHU00022743	LPD_00014563	RADS_CRT_00000009
CHU00028736	LPD_00014564	RADS_CRT_00000010
CHU00028757	LPD_00014575	SDCRT-0005854
CHU00029340	LPD_00014578	SDCRT-0005856
CHU00125146	LPD_00014581	SDCRT-0022060
CHU00500954	LPD_00014582	SDCRT-0023349
CHU00500981	LPD_00014583	SDCRT-0029302
CHU00660366	LPD_00014592	SDCRT-0079461
CHU00678938	LPD_00014597	SDCRT-0086230

**Exhibit B: Documents Considered in the
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Part 1: Bates Numbered Documents**

SDCRT-0086256

SDCRT-0087007

SDCRT-0087312

SDCRT-0087340

SDCRT-0087700

SDCRT-0087719

SDCRT-0087741

SDCRT-0087970

SDCRT-0091027

SDCRT-0091855

SDCRT-0203797

SEAI-CRT-00643130

SEAR_CRT00000007

SEAR_CRT00000011

SEAR_CRT00000012

SEAR_CRT00000014

SEAR_CRT00000015

SEAR_CRT00000016

SEAR_CRT00000017

SEAR_CRT00000018

SEAR_CRT00000019

SEAR_CRT00000020

SEAR_CRT00000021

SEAR_CRT00000022

SEC-CRT-00000014

SEC-CRT-00000015

TACP-CRT-00060531

TACP-CRT-00075852

TACP-CRT-00096980

TAEC-CRT-00090127

Exhibit B: Documents Considered in the Expert Report of Rebuttal

Declaration of Janet S. Netz, Ph. D.

Part 2: Confidential Documents without Bates Numbers

02 May 2005, Best Buy Receipt for Steve Ganz, <<Ganz Best Buy Receipt.pdf>>.

Chiu, Michelle Park, 06 February 2013, Letter from Michelle Park Chiu to Craig C. Corbitt and Heather T. Rankie, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division).

DalSanto, Matthew R., 05 February 2013, Letter from Matthew R. DalSanto to Craig C. Corbitt and Heather T. Rankie, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division).

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Nelson, Laura E., 05 December 2012, Letter, Laura E. Nelson Response to Eva Cole's Email of November 29, 2012 and Data Questions.

Ganske, Rodney, 20 November 2012, Letter, Re: Data Letter on Sales Data in Response to October 2, 2012 Subpoena to Produce Documents and Deposition Subpoena to Dell Inc..

17 December 2012, Memorandum of Law in Support of Defendants' Motion to Strike The Proposed Expert Testimony of Dr. Janet S. Netz, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division).

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Philips Multimedia Flat Displays, Undated, Product Code Description, LPD Server Production <<Compaq\D-DRIVE\Department\Accounting\123DATA\Pre SAP Sales\PRODCODE.DBF>>.

Undated, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division).

Exhibit B: Documents Considered in the Expert Report of Rebuttal

Declaration of Janet S. Netz, Ph. D.

Part 2: Confidential Documents without Bates Numbers

03 December 2012, Deposition of Best Buy Co. 30(b)(6) Witness Brian Stone.

07 December 2012, Deposition of Costco Wholesale Corporation 30(b)(6) Witness Geoffrey Shavey.

16 January 2013, Deposition of Dae Eui Lee, Volume I.

17 January 2013, Deposition of Dae Eui Lee, Volume II.

18 January 2013, Deposition of Dae Eui Lee, Volume III.

23 August 2012, Deposition of Hitachi America, LTD. 30(b)(6) Witness Modesto Rodriguez.

23 August 2012, Deposition of Hitachi America, LTD. 30(b)(6) Witness William Allen Whalen.

19 July 2012, Deposition of Hitachi Asia and Hitachi, Ltd. 30(b)(6) Witness Yasuhiko Kawashima.

17 July 2012, Deposition of Hitachi Displays, Ltd. 30(b)(6) Witness Nobuhiko Kobayashi, Volume I.

11 July 2012, Deposition of Hitachi Displays, Ltd. 30(b)(6) Witness Toru Iwasawa.

18 July 2012, Deposition of Hitachi Displays, Ltd. 30(b)(6) Witness Yasuhiko Kawashima, Volume I.

12 July 2012, Deposition of Hitachi Displays, Ltd. 30(b)(6) Witness Yasuhiro Morishima, Volume I.

03 July 2012, Deposition of Hitachi Electronic Devices (USA) 30(b)(6) Witness Thomas Heiser.

18 July 2012, Deposition of Hitachi, Ltd. 30(b)(6) Witness Hiroshi Eguchi.

12 July 2012, Deposition of Hitachi, Ltd. 30(b)(6) Witness Yasu Hisa Takeda, Volume I.

15 November 2012, Deposition of Janet S. Netz, PH.D.

09 July 2012, Deposition of LG Electronics 30(b)(6) Witness Choong Ryul Park, Volume I.

13 July 2012, Deposition of LG Electronics 30(b)(6) Witness Kyung Tae Kwon.

09 July 2012, Deposition of LG Electronics 30(b)(6) Witness Mok Hyeon Seong.

11 July 2012, Deposition of LG Electronics 30(b)(6) Witness Yun Seok Lee.

13 July 2012, Deposition of Panasonic Corporation 30(b)(6) Witness Takashi Nakano.

17 July 2012, Deposition of Panasonic Corporation, Panasonic North America and MTPD 30(b)(6) Witness Hirokazu Nishiyama, Volume I.

18 July 2012, Deposition of Panasonic Corporation, Panasonic North America and MTPD 30(b)(6) Witness Hirokazu Nishiyama, Volume II.

19 July 2012, Deposition of Panasonic Corporation, Panasonic North America and MTPD 30(b)(6) Witness Mishiro Kimura.

16 July 2012, Deposition of Panasonic Corporation, Panasonic North America and MTPD 30(b)(6) Witness Tatsuo Tobinaga.

**Exhibit B: Documents Considered in the Expert Report of Rebuttal
Declaration of Janet S. Netz, Ph. D.
Part 2: Confidential Documents without Bates Numbers**

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24 January 2013, Deposition of Robert R. Willig.

16 July 2012, Deposition of Samsung Electronics America 30(b)(6) Witness Kim London.

17 July 2012, Deposition of Samsung Electronics America and Samsung Electronics Corporation 30(b)(6) Witness Steve Panosian.

06 June 2012, Deposition of Samsung SDI 30(b)(6) Witness Jaein Lee, Volume I.

07 June 2012, Deposition of Samsung SDI 30(b)(6) Witness Jaein Lee, Volume II.

01 August 2012, Deposition of Toshiba America Consumer Products and Toshiba America Information Systems 30(b)(6) Witness Richard Eugene Huber.

31 July 2012, Deposition of Toshiba America Electronics Corporation 30(b)(6) Witness Jay Alan Heinecke.

30 July 2012, Deposition of Toshiba Corporation 30(b)(6) Witness Koji Kurosawa.

01 August 2012, Deposition of Toshiba Corporation and Toshiba America Consumer Products 30(b)(6) Witness Yoshiaki Uchiyama.

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Exhibit C: Documents Considered in the Expert Report of Rebuttal Declaration of Janet S. Netz, Ph. D.

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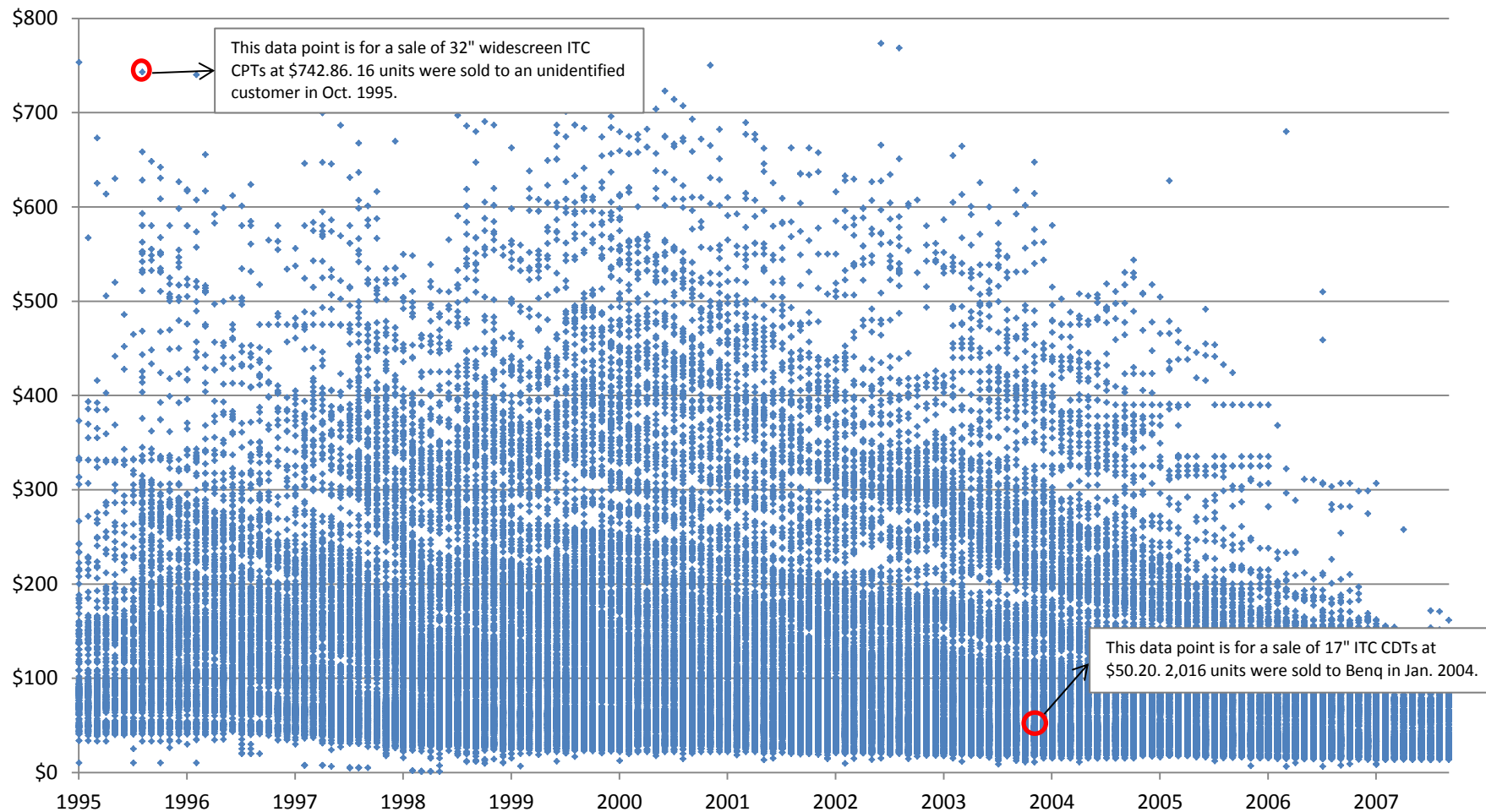
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Professor Willig's Exhibit 1A: Dispersion in Monthly Prices Across All CRT Models and All Customers

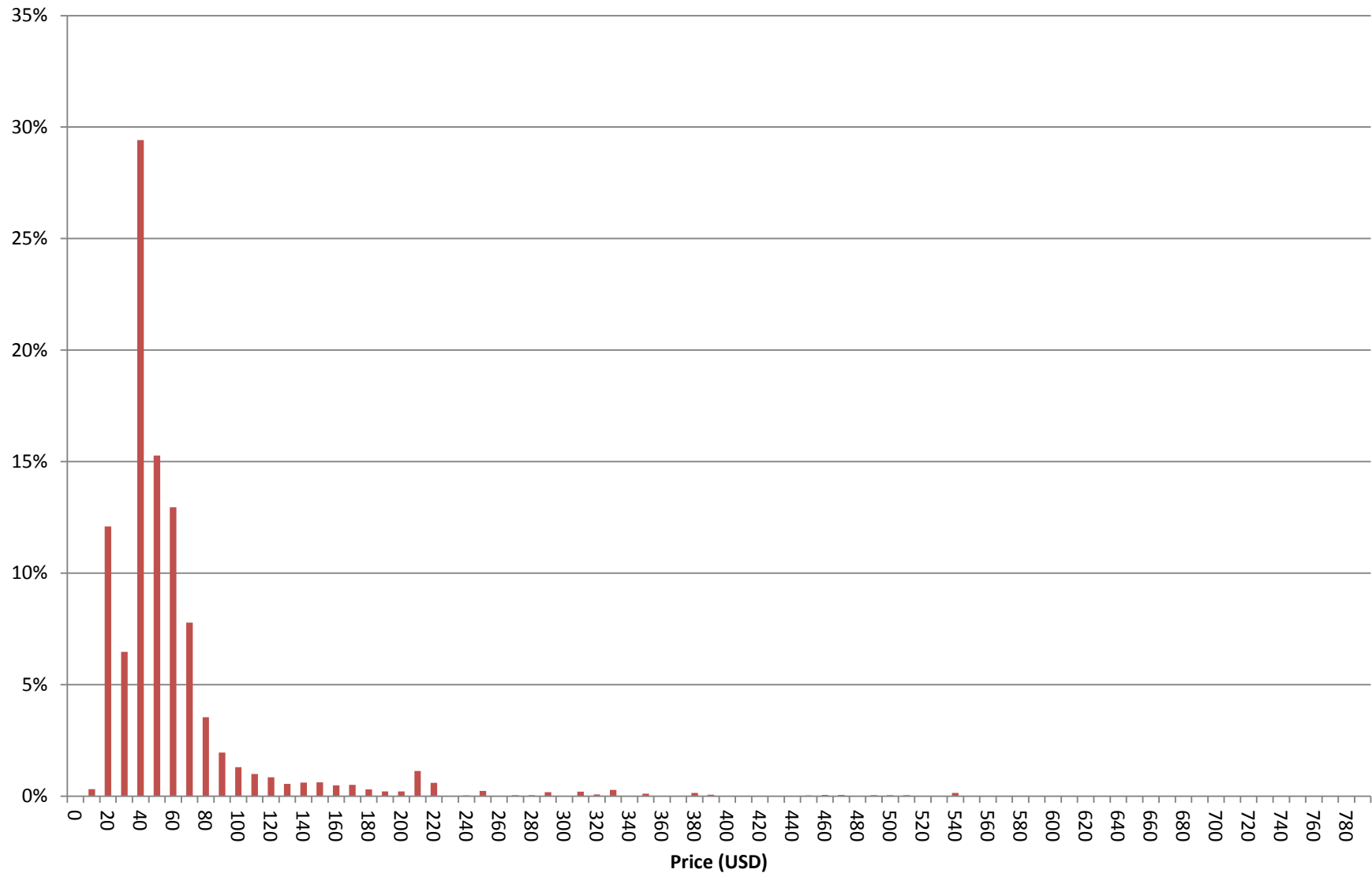


Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes: (1) Each observation represents the volume-weighted average price at which a specific CRT model was sold to a specific customer in a specific month; (2) A *de minimis* number of observations are outside the range of the y-axis; (3) Sales between integrated entities that sold CRTs were excluded.

appliance note: This exhibit is identical to Professor Willig's 1A with the exception of the red circles and text boxes.

Distribution of CRT Sales for All CRTs Sold in August 2001



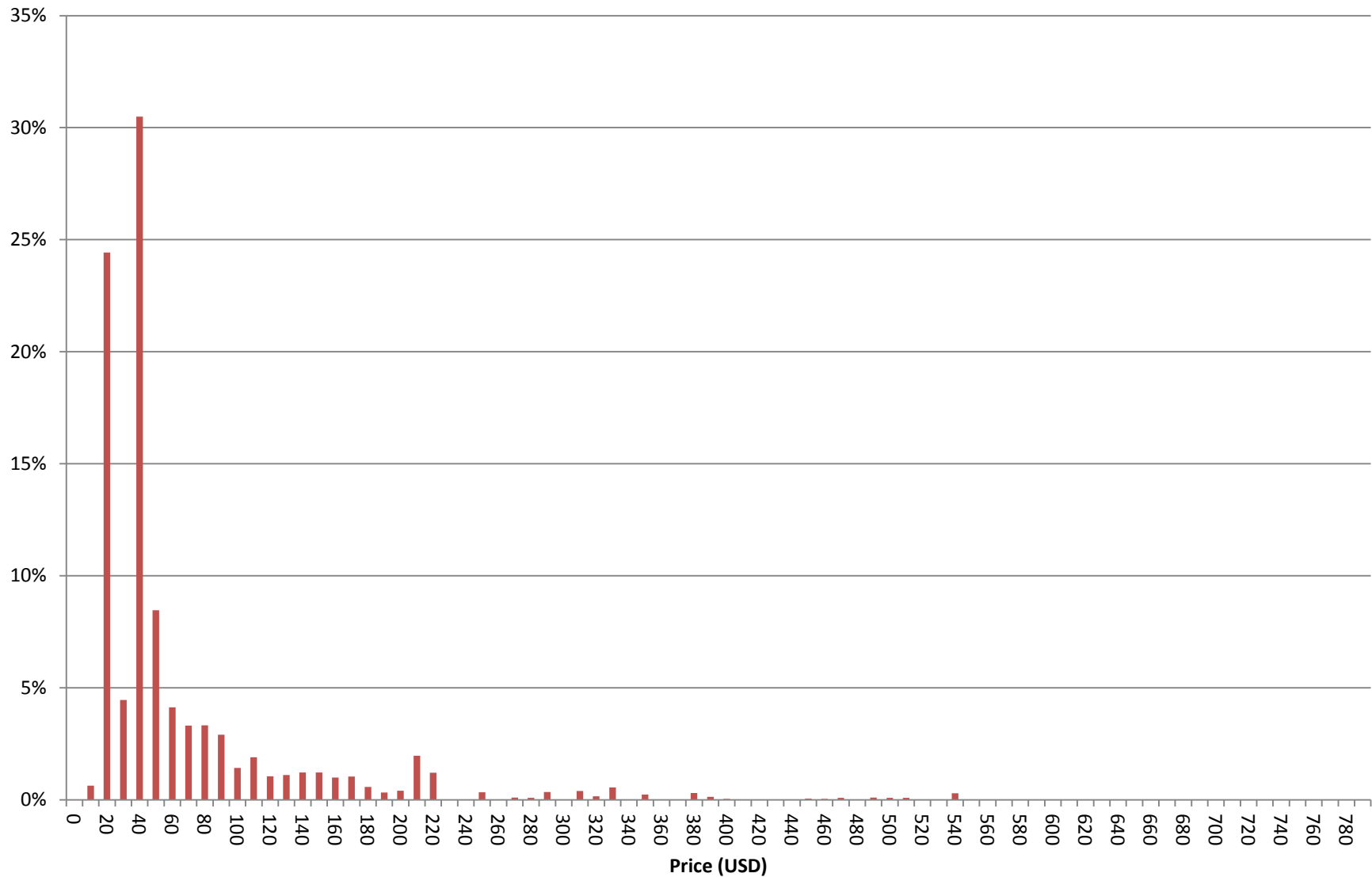
Value shown represents the lower bound of the price range.

Note(s): Percentages are based on quantities purchased rather than number of observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx and Exhibit 1A -- August 2001.do

Distribution of CPT Sales for All CPTs Sold in August 2001



Value shown represents the lower bound of the price range.

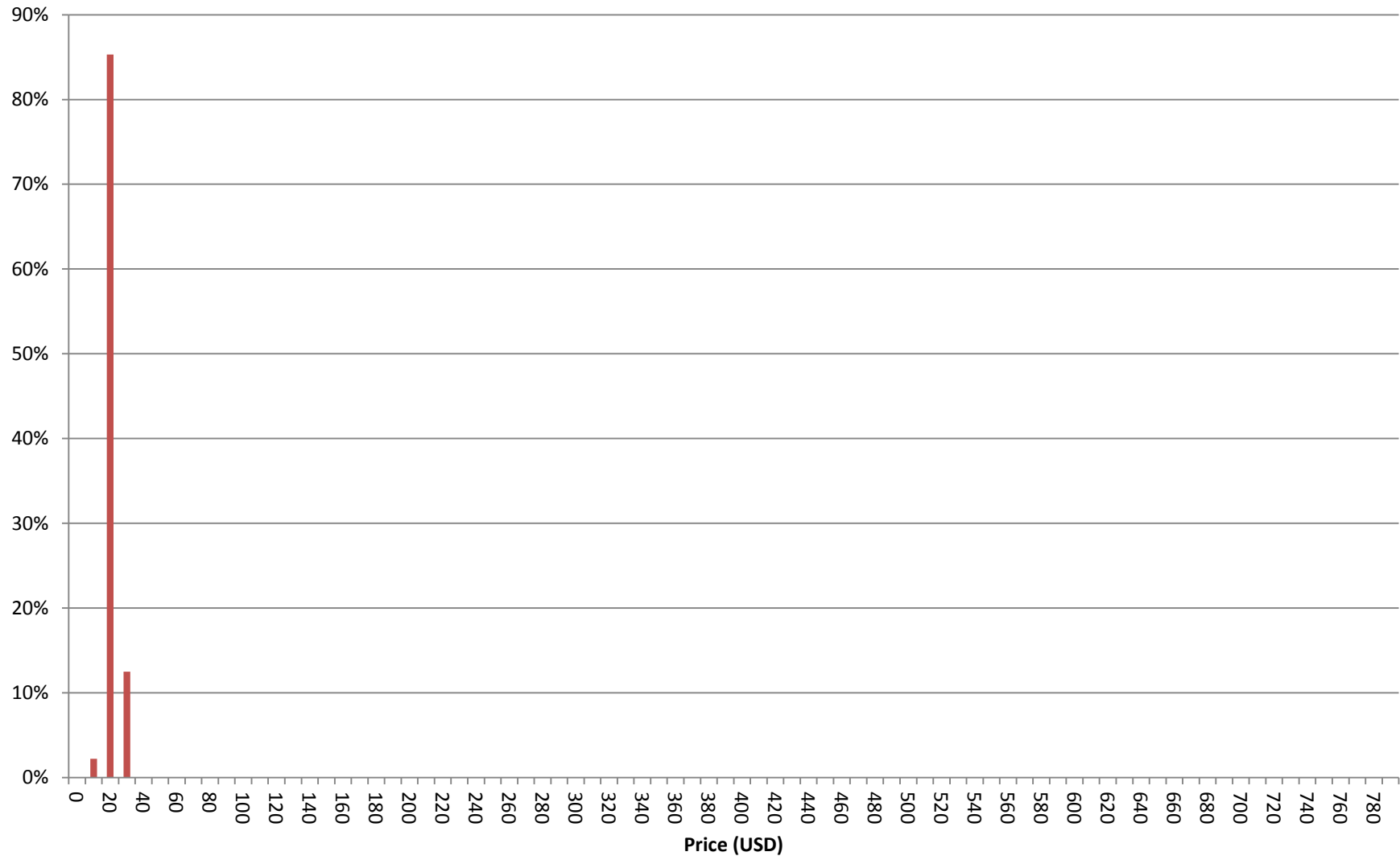
Note(s): Percentages are based on quantities purchased not observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx and Exhibit 1A -- August 2001.do

Distribution of 14-Inch CPT Sales in August 2001

14" CPT are 22% of all CPT units and are 29% of CPT units in August 2001.



Value shown represents the lower bound of the price range.

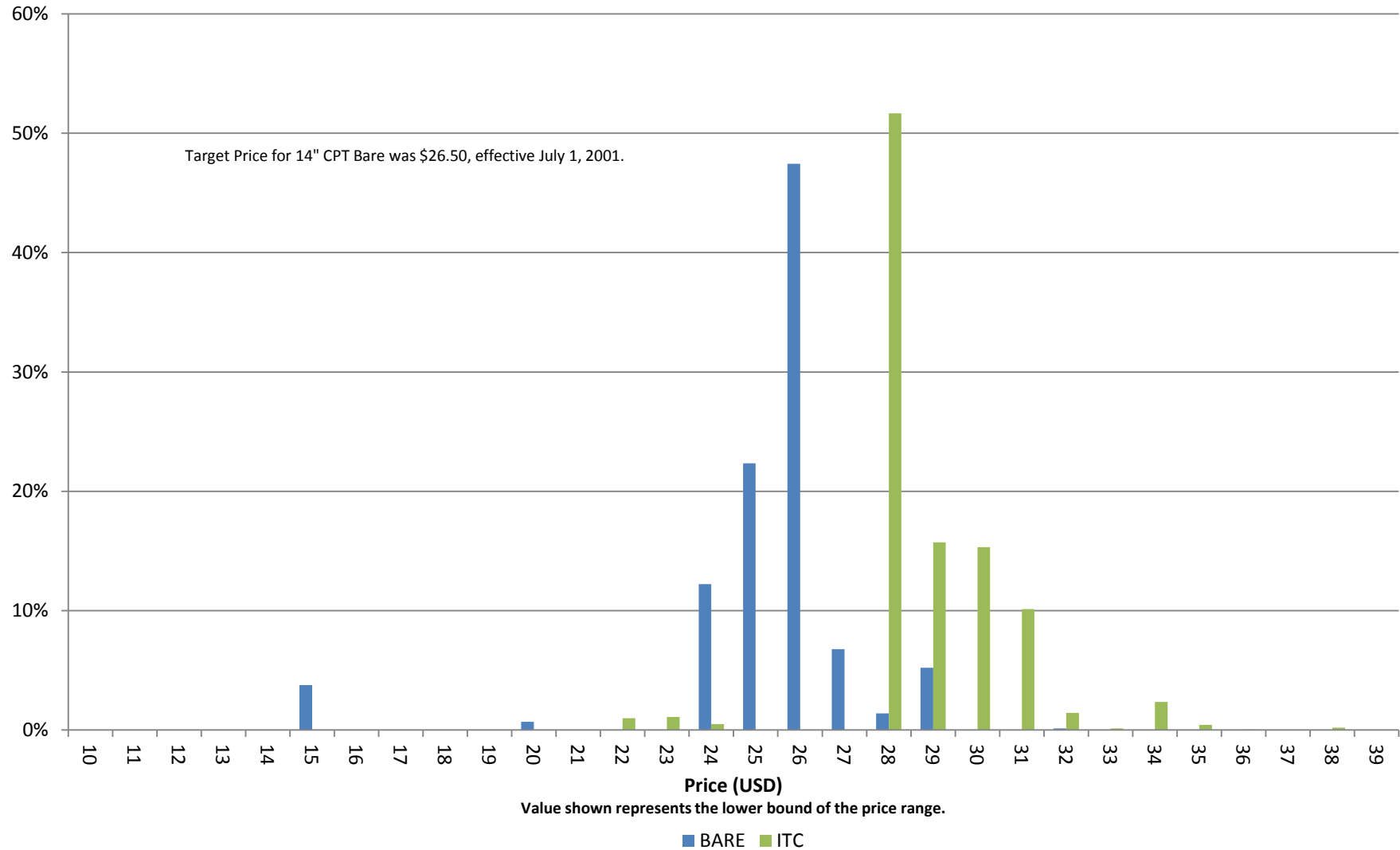
Note(s): Percentages are based on quantities purchased not observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx, Exhibit 1A -- August 2001.do, and August 2001 data 1A.log

Distribution of 14-Inch CPT Sales by Finish in August 2001

14-inch CPTs are 22% of all CPT units and are 29% of CPT units in August 2001.



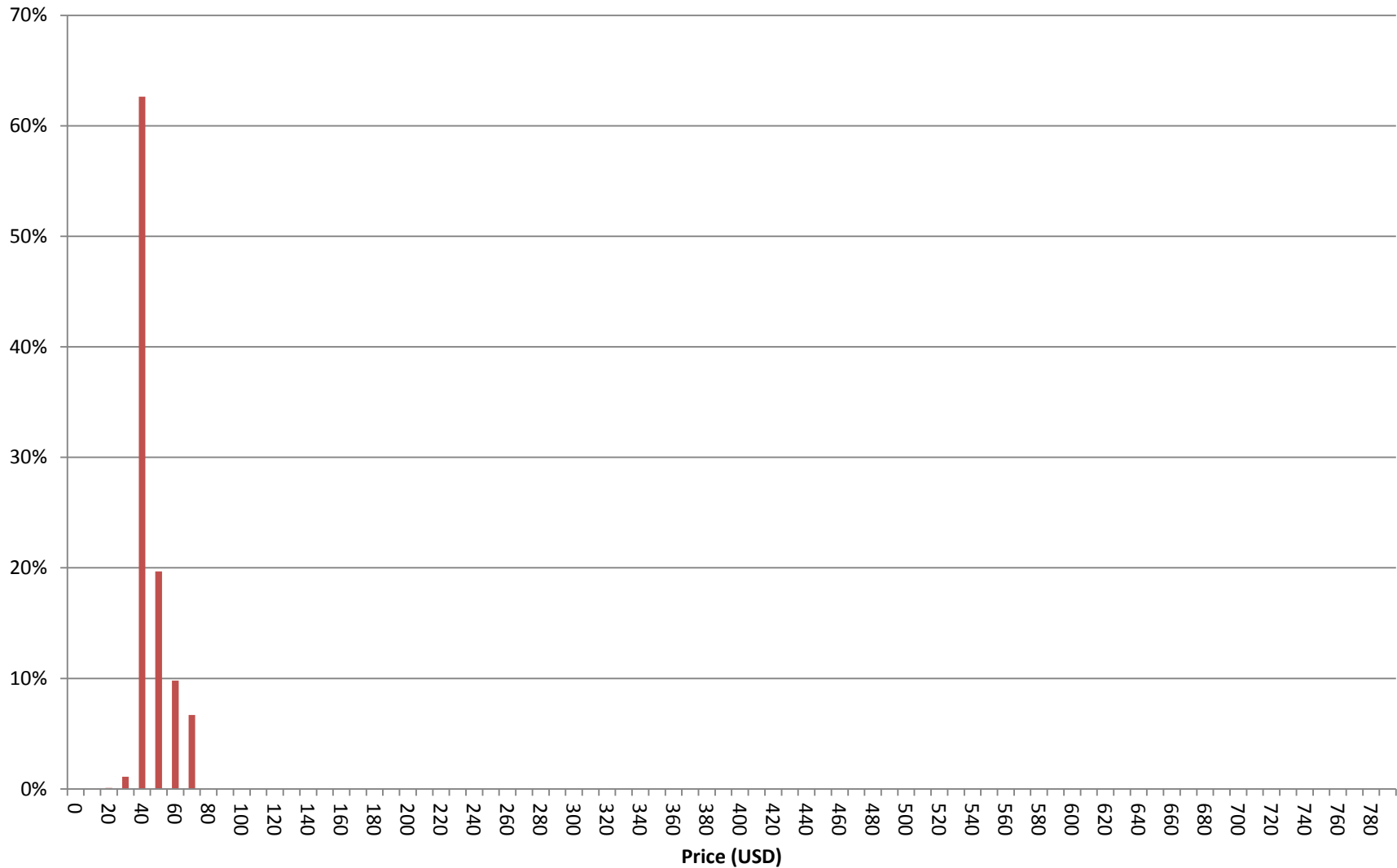
Note(s): Percentages are based on quantities purchased not observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx, Exhibit 1A -- August 2001.do, August 2001 data 1A.log, and Target price-structure.xlsx

Distribution of 20 and 21-Inch CPT Sales in August 2001

20" and 21" CPTs are 43% of all CPT units and are 41% of CPT units in August 2001.



Value shown represents the lower bound of the price range.

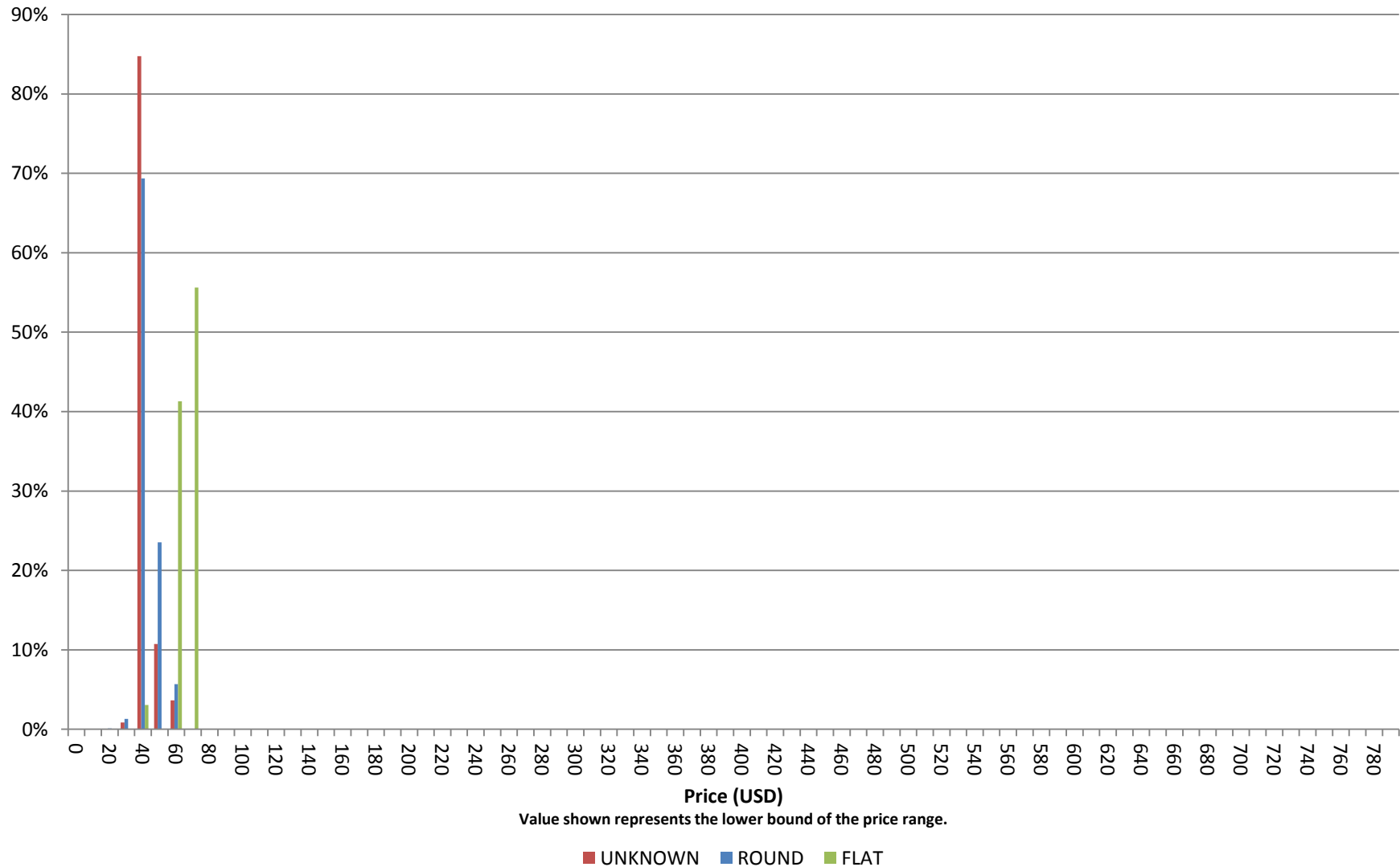
Note(s): Percentages are based on quantities purchased not observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx, Exhibit 1A -- August 2001.do, and August 2001 data 1A.log

Distribution of 20 and 21-Inch CPT Sales by Shape in August 2001

20" and 21" CPTs are 43% of all CPT units and are 41% of CPT units in August 2001.



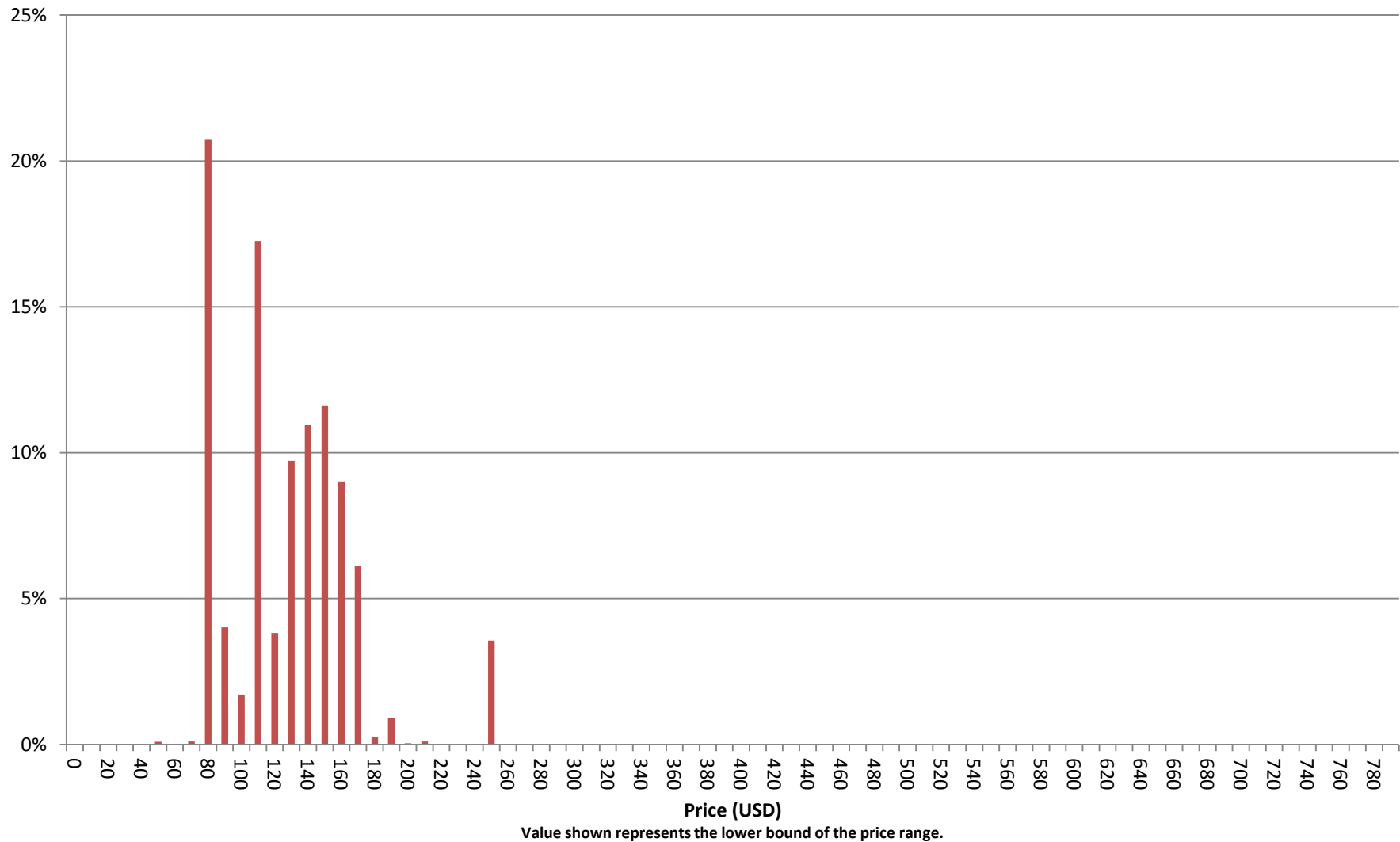
Note(s): Percentages are based on quantities purchased not observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx, Exhibit 1A -- August 2001.do, and August 2001 data 1A.log

Distribution of 29-Inch CPT Sales in August 2001

29-inch CPTs are 16% of all CPT units and are 9% of CPT units in August 2001.



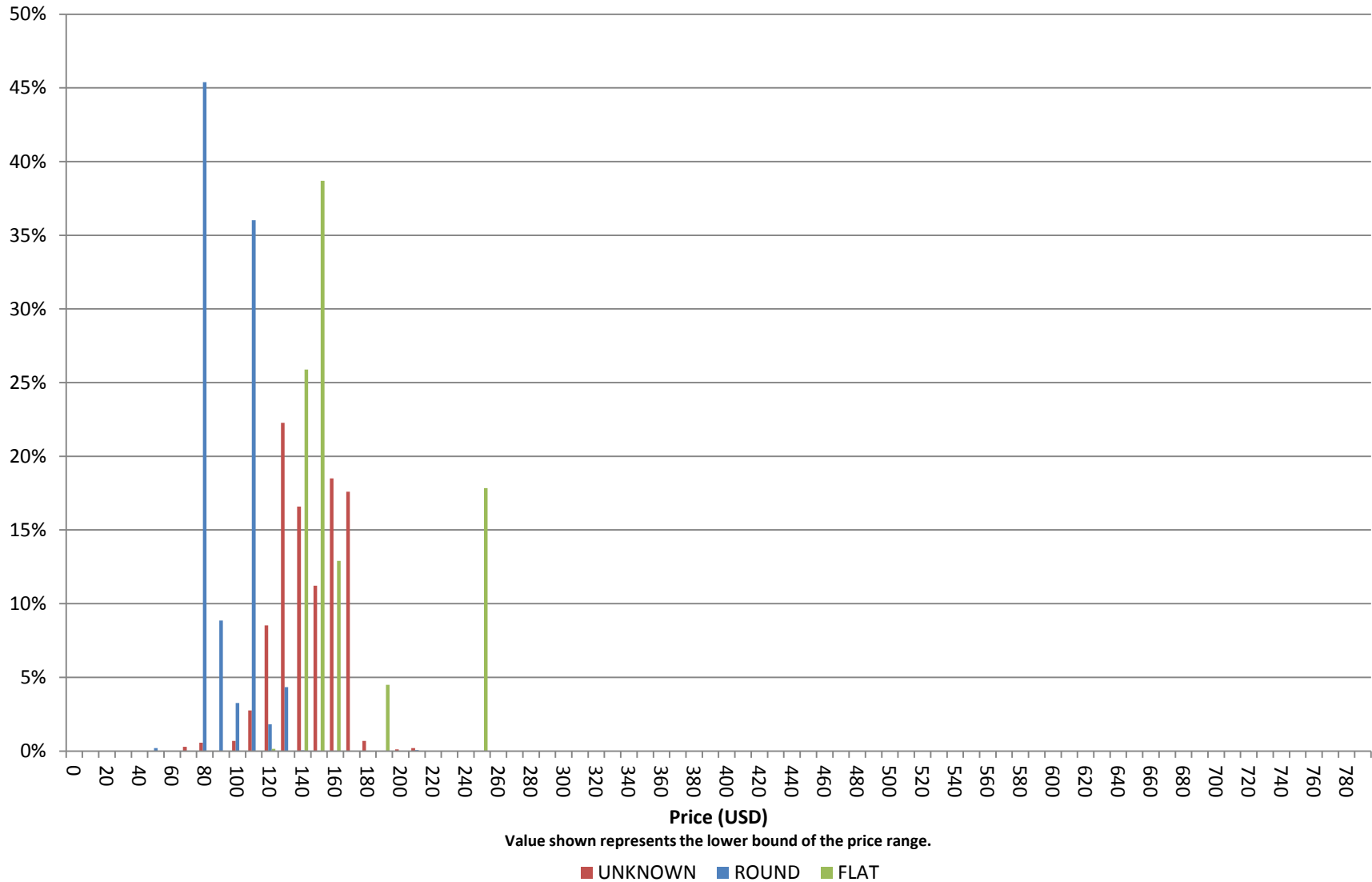
Note(s): Percentages are based on quantities purchased not observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx, Exhibit 1A -- August 2001.do, and August 2001 data 1A.log

Distribution of 29-Inch CPT Sales by Shape in August 2001

29-inch CPTs are 16% of all CPT units and are 9% of CPT units in August 2001.

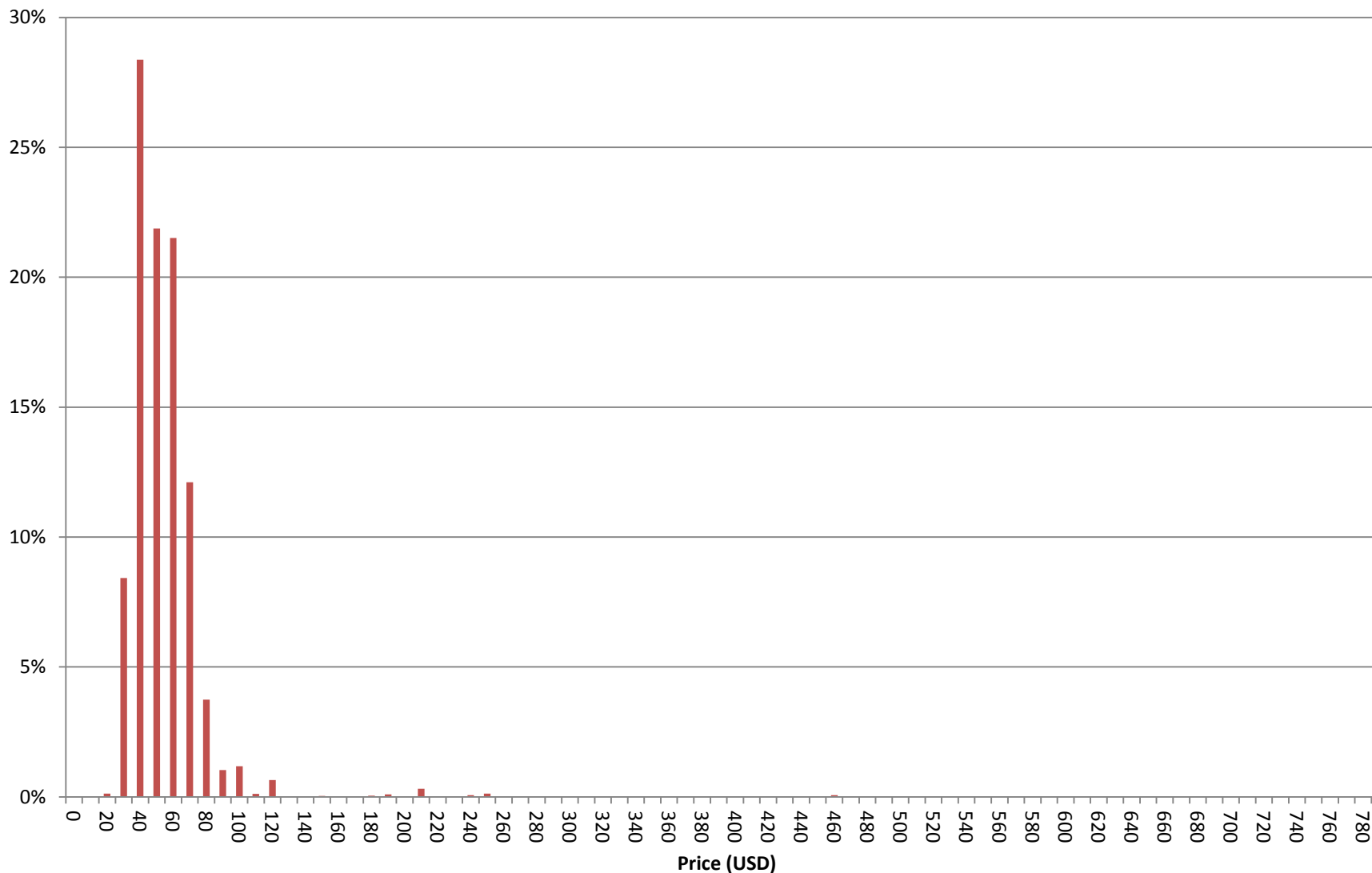


Note(s): Percentages are based on quantities purchased not observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx, Exhibit 1A -- August 2001.do, and August 2001 data 1A.log

Distribution of CDT Sales for All CDTs Sold in August 2001



Value shown represents the lower bound of the price range.

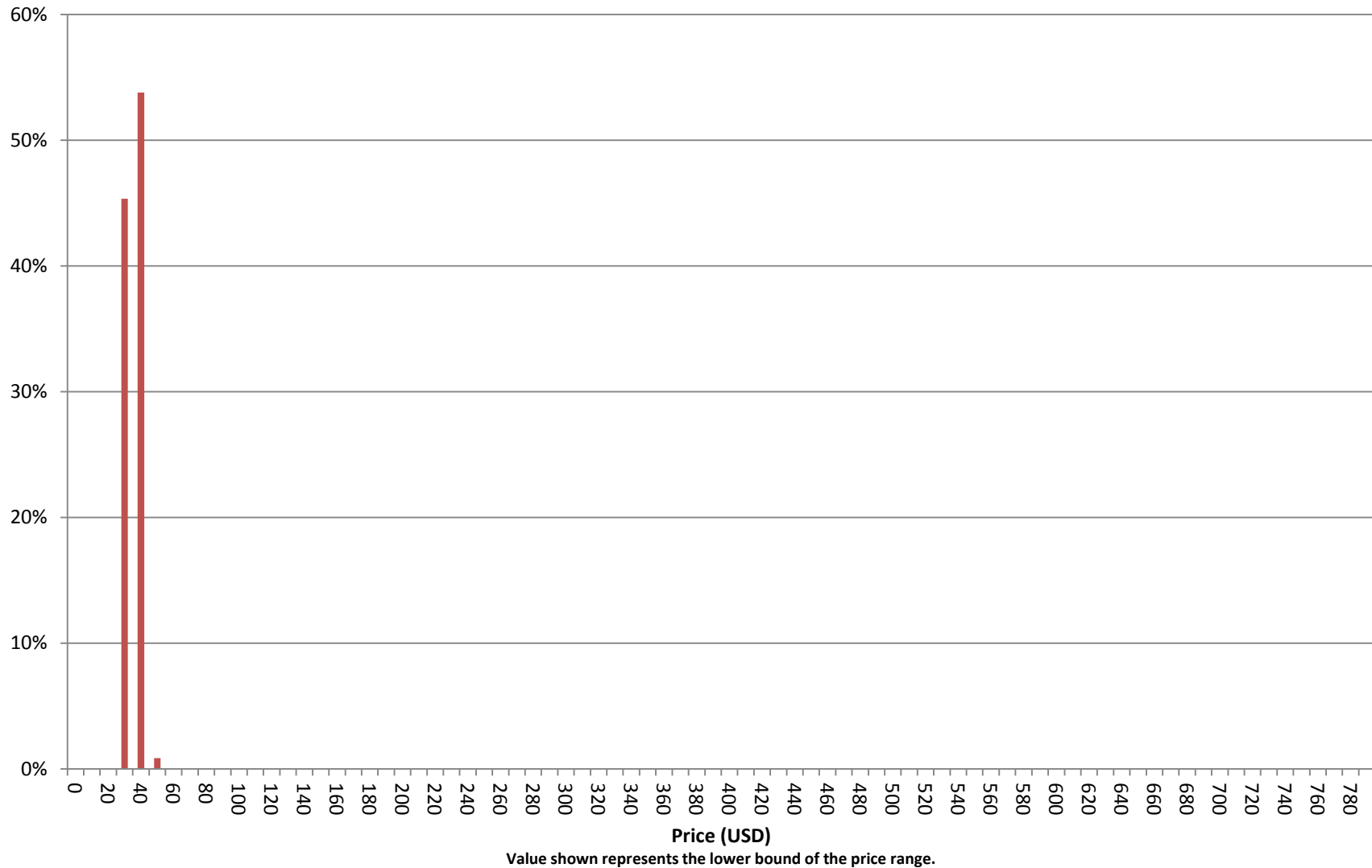
Note(s): Percentages are based on quantities purchased not observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx and Exhibit 1A -- August 2001.do

Distribution of 14-Inch CDT Sales in August 2001

14" CDT are 12% of all CDT units and are 4% of CDT units in August 2001.



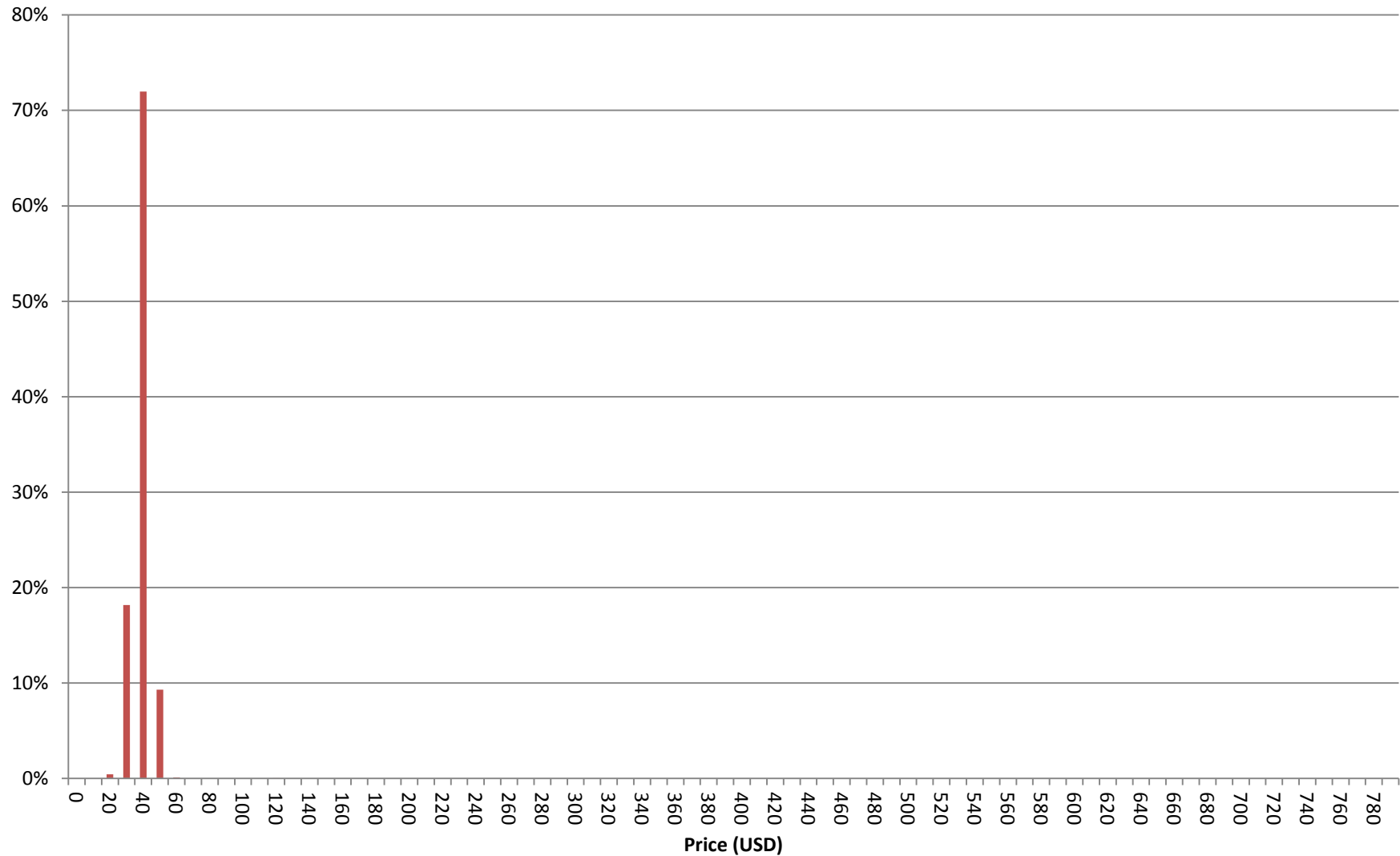
Note(s): Percentages are based on quantities purchased not observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx, Exhibit 1A -- August 2001.do, and August 2001 data 1A.log

Distribution of 15-Inch CDT Sales in August 2001

15" CDT are 25% of all CDT units and are 28% of CDT units in August 2001.



Value shown represents the lower bound of the price range.

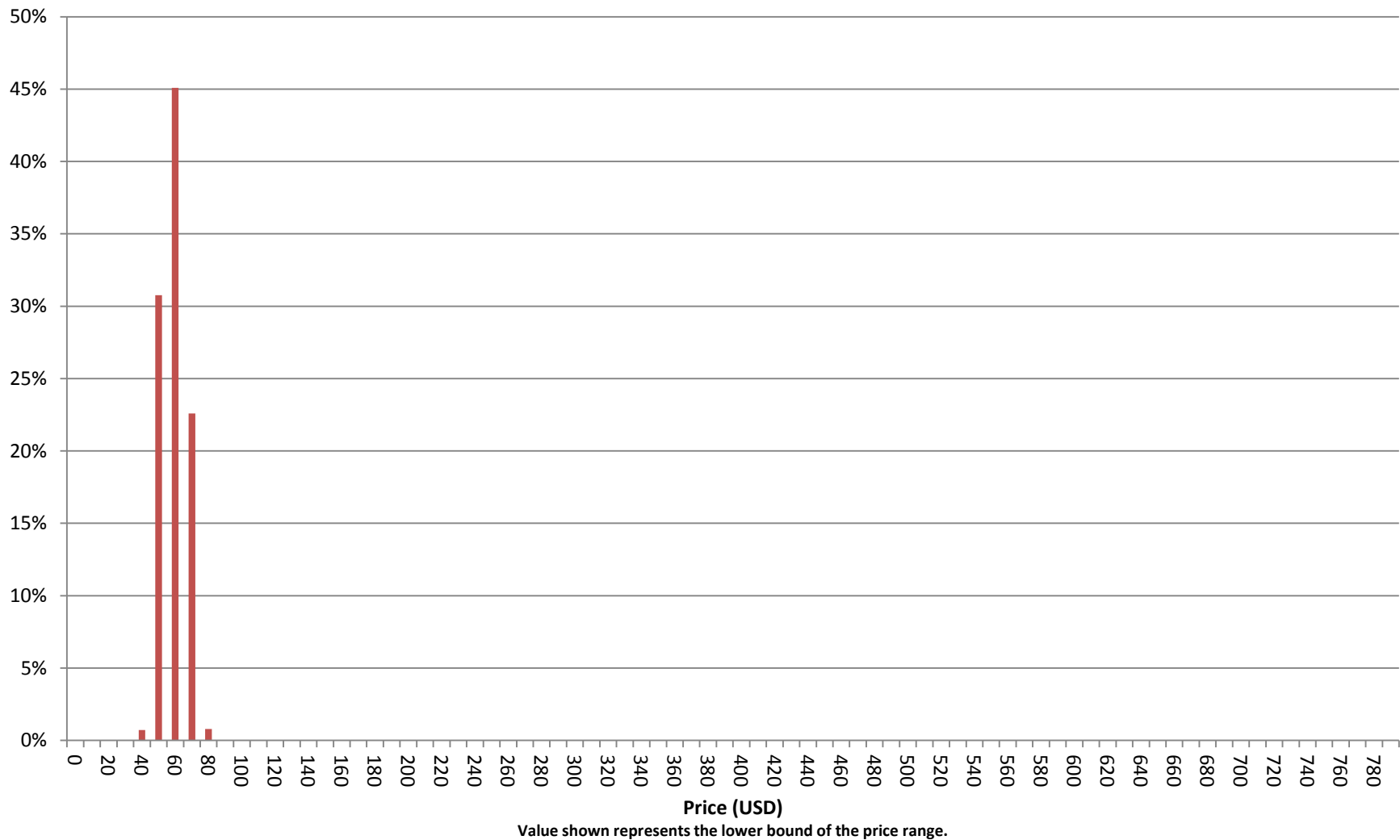
Note(s): Percentages are based on quantities purchased not observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx, Exhibit 1A -- August 2001.do, and August 2001 data 1A.log

Distribution of 17-Inch CDT Sales in August 2001

17" CDT are 45% of all CDT units and are 46% of CDT units in August 2001.



Note(s): Percentages are based on quantities purchased not observations.

Data Source(s): tube_sales_data_compilation.dta

Source File(s): August 2001 data 1A.xlsx, Exhibit 1A -- August 2001.do, and August 2001 data 1A.log

Total Yearly Share of CRT Unit Sales by Top 5 Design Families

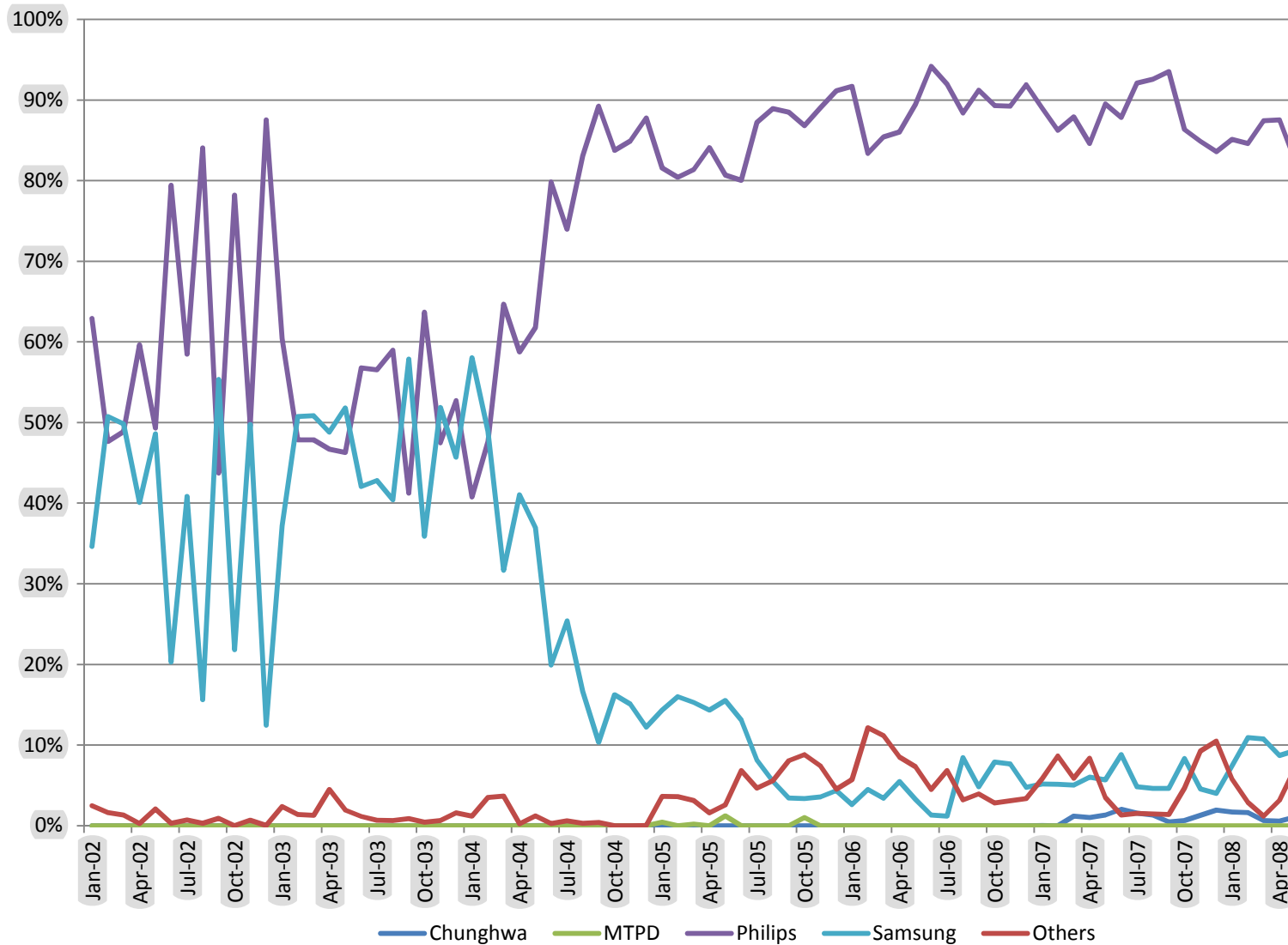
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Weighted Average
Hitachi	CDT	.	.	96%	91%	85%	74%	86%	97%	.	.	.	.	87.2%
	CPT	100%	100%	94%	94%	96%	96%	99%	100%	100%	.	.	.	96.0%
Chunghwa	CDT	100%	100%	100%	100%	99%	95%	97%	97%	99%	99%	97%	94%	98.1%
	CPT	100%	100%	100%	100%	100%	100%	100%	100%	95%	95%	94%	94%	96.7%
Philips	CDT	100%	100%	100%	99%	100%	.	.	.	.	.	.	.	99.8%
	CPT	87%	89%	90%	93%	95%	.	.	.	.	.	.	.	89.9%
Toshiba	CDT	98%	89%	87%	92%	95%	97%	96%	89%	97%	.	.	.	92.6%
	CPT	53%	49%	78%	77%	78%	74%	73%	75%	80%	100%	.	.	72.6%

Note(s): Only data containing WTDS-standard model numbers were used. Data are limited to class period years.

Source File(s): sales by design group.xlsx

Data Source(s): all_defendants_dropexout_collapsed.dta

Share of LGE 21-Inch CPT Purchases, by Vendor and Month

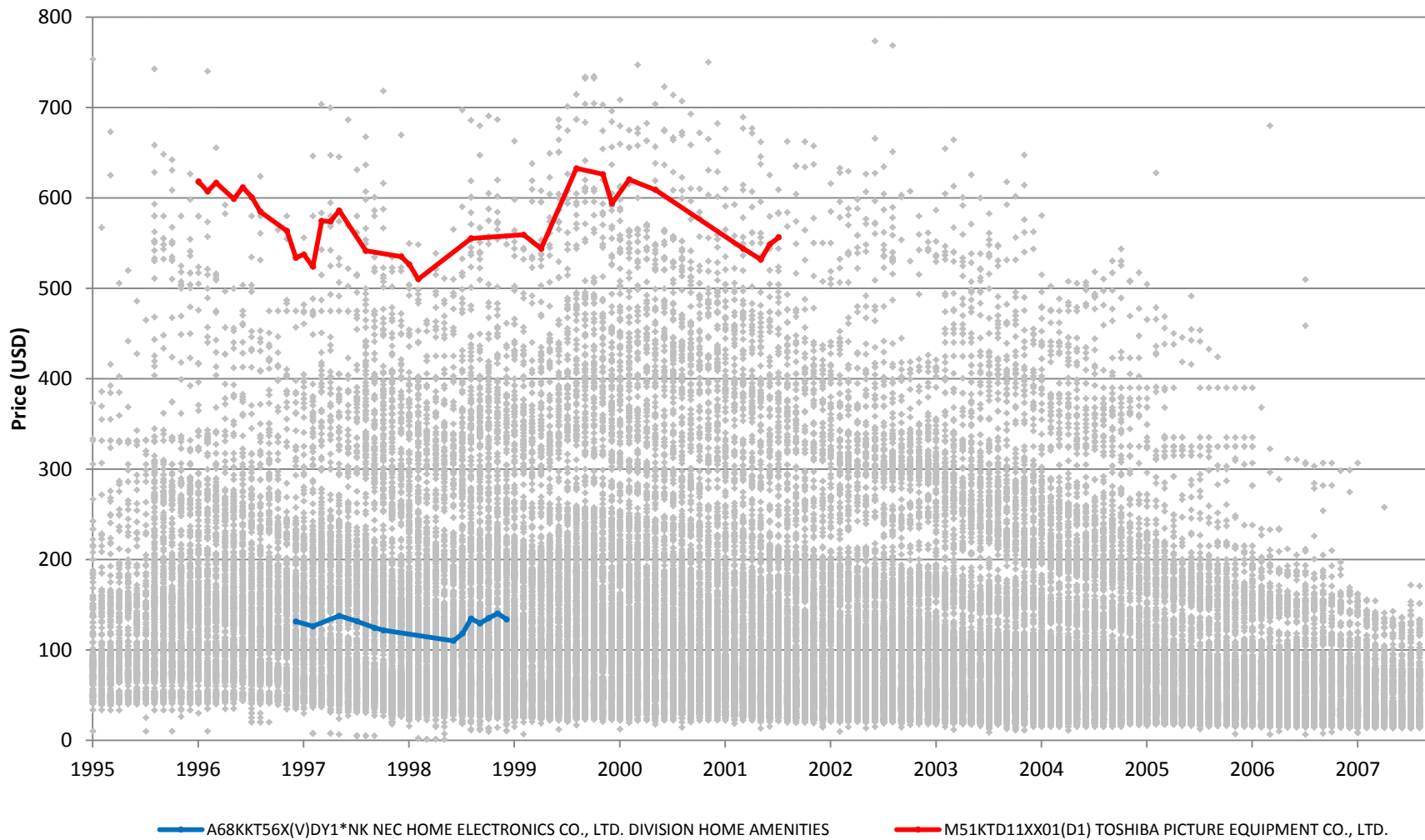


Note(s): Percentages are based on quantities purchased.

Data Source(s): LGE--Highly Confidential 7.xls

Source File(s): LGE Substitution.xlsx and LGE Substitution.do

Prices for a Specific 21-Inch CDT and 29-Inch CPT in USD as Shown in Willig's Exhibit 1A

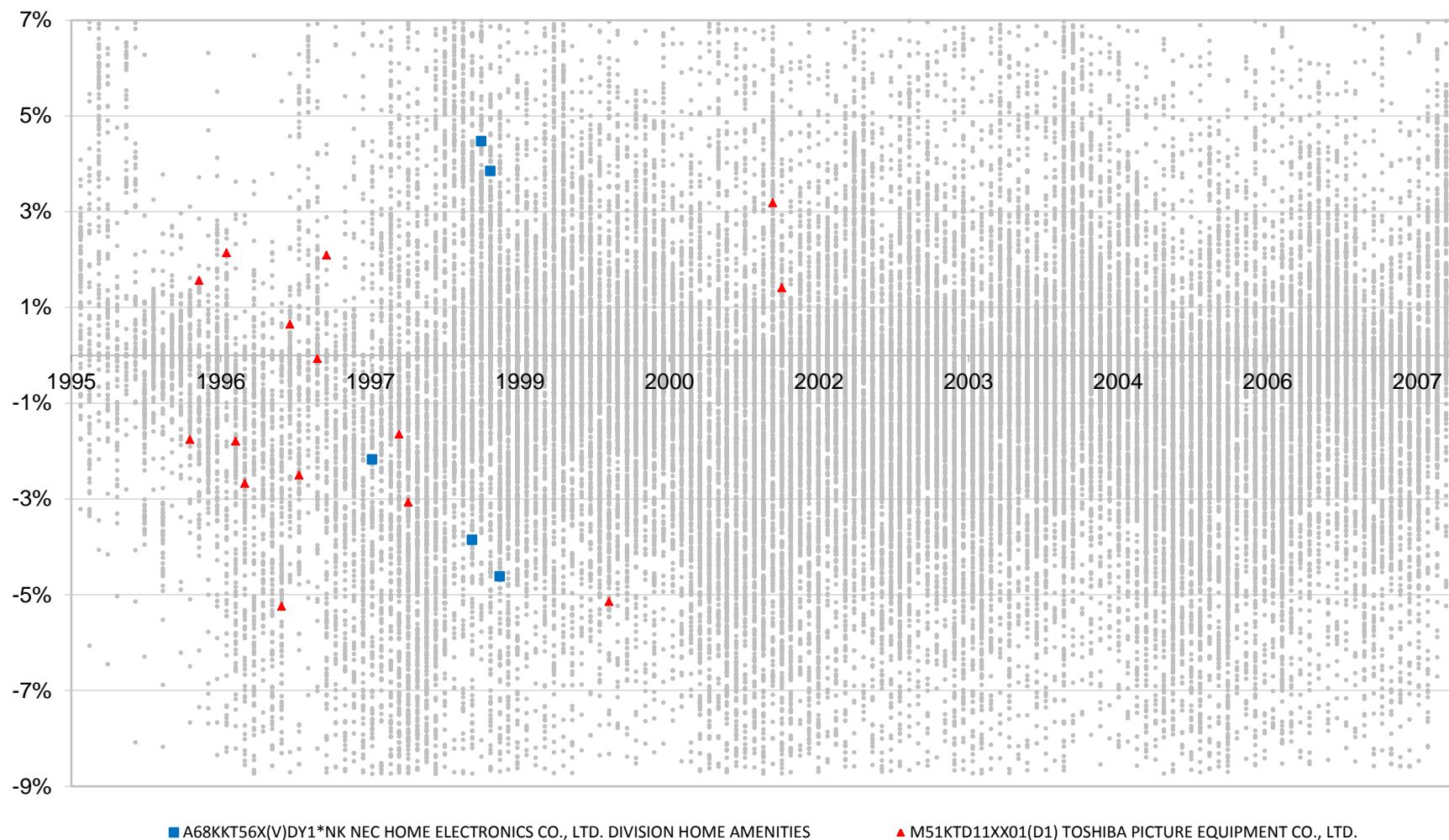


Note(s): The 21" ITC CDT is model M51KTD11XX01(D1) and was sold to Toshiba Picture Equipment Co., Ltd. by Toshiba. The 29" Bare CPT is model A68KKT56X(V)DY1*NK and was sold to NEC Home Electronics Co., Ltd. Division Home Amenities by Toshiba.

Data Source(s): all_defendants_dropexout_collapsed.dta

Source File(s): Exhibit 1A.xlsx and Exhibit 1A - Rebuttal.do

Price Changes for a Specific 21-Inch CDT and 29-Inch CPT in USD as Shown in Professor Willig's Exhibit 2A

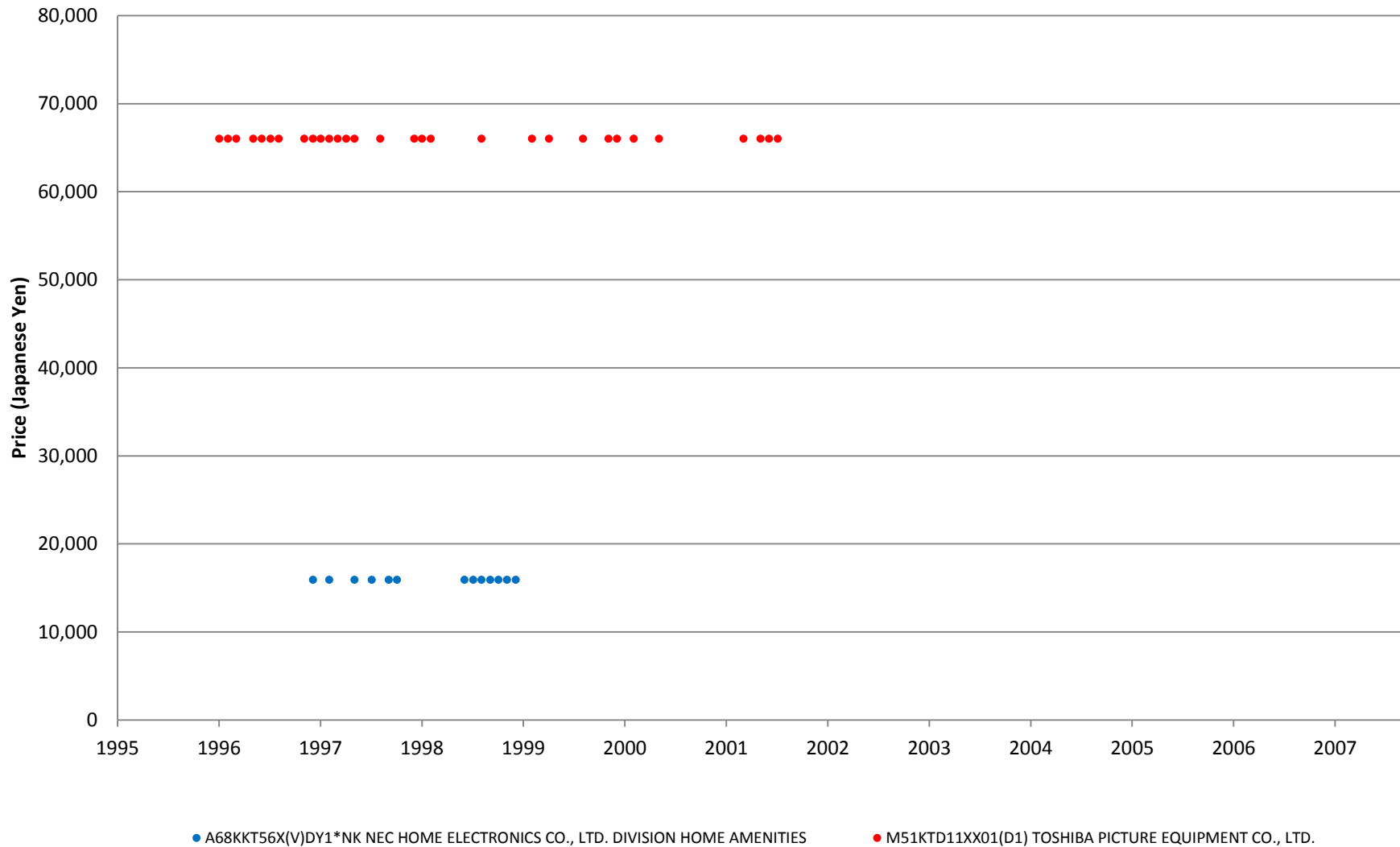


Note(s): The 21" ITC CDT is model M51KTD11XX01(D1) and was sold to Toshiba Picture Equipment Co., Ltd. by Toshiba. The 29" Bare CPT is model A68KKT56X(V)DY1*NK and was sold to NEC Home Electronics Co., Ltd. Division Home Amenities by Toshiba.

Data Source(s): all_defendants_dropexout_collapsed.dta

Source File(s): Exhibit 2A.xlsx and Exhibit 2A - Rebuttal.do

Prices for a Specific 21-Inch CDT and 29-Inch CPT in Local Currency (Yen)



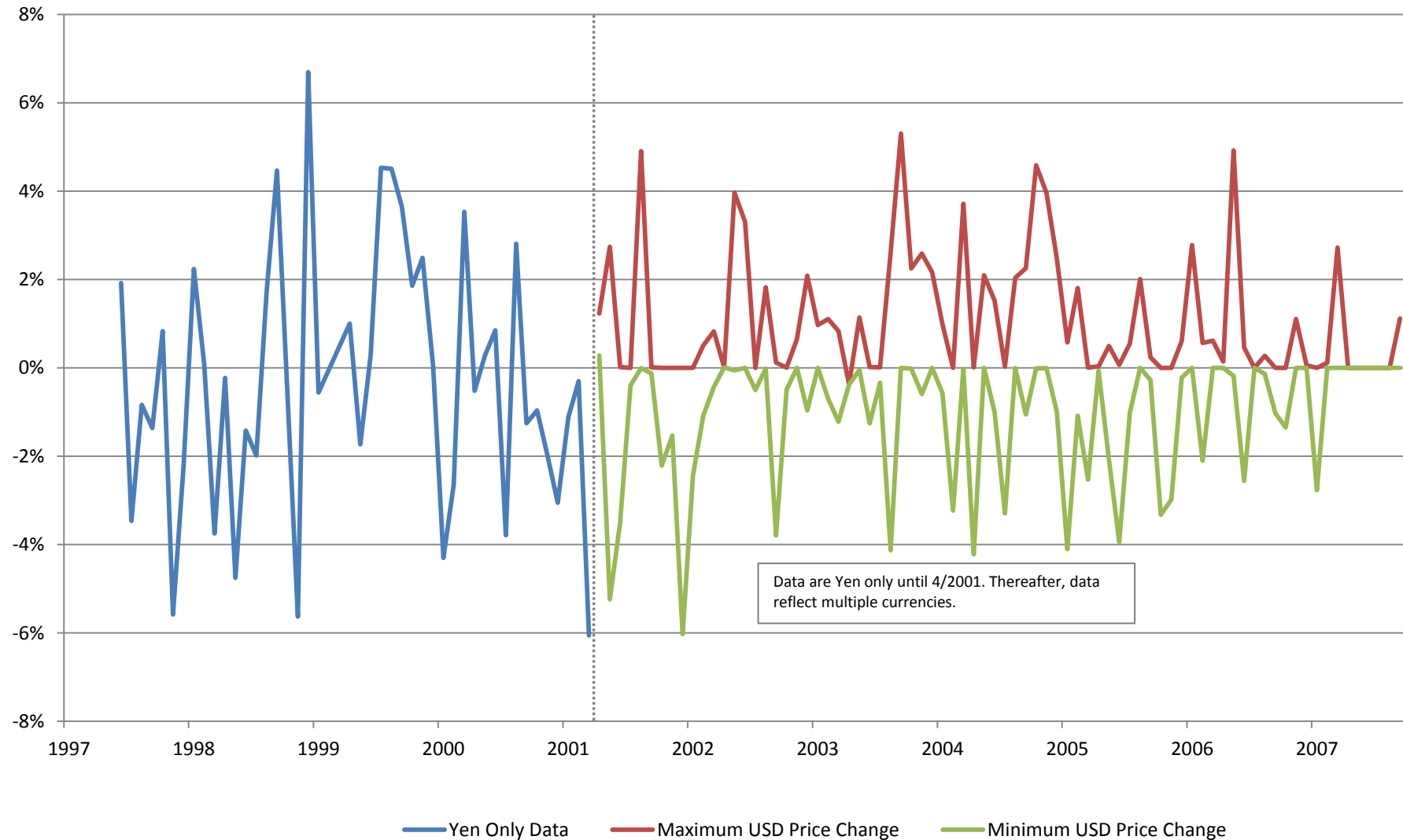
Note(s): The 21" ITC CDT is model M51KTD11XX01(D1) and was sold to Toshiba Picture Equipment Co., Ltd. by Toshiba. The 29" Bare CPT is model A68KKT56X(V)DY1*NK and was sold to NEC Home Electronics Co., Ltd. Division Home Amenities by Toshiba.

Data Source(s): all_defendants_dropexout_collapsed.dta

Source File(s): Exhibit 1A.xlsx and Exhibit 1A - Rebuttal.do

Panasonic USD Price Changes When Local Prices Are Constant

Volatility due entirely to changes in exchange rates



Note(s): Includes Panasonic data for observations in which local prices do not change.

Data Source(s): scatter_month_local.dta

Source File(s): Exhibit 2A - Rebuttal.do, Exhibit 2A - Panasonic no change.do, and Exhibit 2A - Panasonic no change.xlsx .

January 1998 Month-to-Month Changes in USD and Local Currencies

Vendor	Willig's Model	US Dollars Willig		Local Currency		Month-to-Month Change	
		Dec-1997	Jan-1998	Dec-1997	Jan-1998	USD	Local
Hitachi	A68JSA60XBARESANYO ELECTRIC CO., LTD.	198.87	199.15	25800	25800	0.14%	0.00%
Hitachi	A80LJF30X(W)BARESHARP CORPORATION	254.37	254.73	33000	33000	0.14%	0.00%
Hitachi	W76LHH147X(D)BARESHARP CORPORATION	285.20	285.61	37000	37000	0.14%	0.00%
Panasonic	A34JCD91XBAREDMD	45.35	46.37	5900	5900	2.24%	0.00%
Panasonic	A51JXS95XBAREDMD	80.40	82.20	10460	10460	2.24%	0.00%
Panasonic	W66LKV088XBAREHITACHI	136.05	135.56	17700	17250	-0.36%	-2.54%
Panasonic	W66LMK188XBAREHITACHI	172.18	176.03	22400	22400	2.24%	0.00%
Panasonic	W86KYP181XBAREHITACHI	522.67	534.38	68000	68000	2.24%	0.00%
Panasonic	A22JWG098XBAREJVC	76.86	78.59	10000	10000	2.24%	0.00%
Panasonic	M36JGK90XBAREJVC	83.15	85.01	10818	10818	2.24%	0.00%
Panasonic	M68JXR195XBAREJVC	172.55	176.42	22449	22449	2.24%	0.00%
Panasonic	W66LKV081XBAREJVC	133.34	136.32	17347	17347	2.24%	0.00%
Panasonic	W76LHQ081XBAREJVC	290.20	296.70	37755	37755	2.24%	0.00%
Panasonic	W76LFC185X05ITCMELUK	327.47	334.81	42604	42604	2.24%	0.00%
Panasonic	W66LKV081XBAREMITSUBISHI	138.36	141.45	18000	18000	2.24%	0.00%
Panasonic	A34JQQ90XBAREPSEC	37.05	37.88	4820	4820	2.24%	0.00%
Panasonic	W56LCF061XBAREPSEC	99.92	102.16	13000	13000	2.24%	0.00%
Panasonic	W66LFC161XBARESANYO	147.96	151.28	19250	19250	2.24%	0.00%
Panasonic	W66LKV081XBARESANYO	135.66	135.56	17650	17250	-0.08%	-2.27%
Panasonic	W76LHQ081XBARESANYO	284.40	290.77	37000	37000	2.24%	0.00%
Panasonic	W86KYP181XBARESANYO	511.15	522.59	66500	66500	2.24%	0.00%
Panasonic	W56LCF061XBARETSPD(I)	99.92	102.16	13000	13000	2.24%	0.00%
Panasonic	W66LFC995X TBARETSPD(I)	157.57	161.10	20500	20500	2.24%	0.00%
Panasonic	W66LKV081XBARETSPD(I)	138.36	141.45	18000	18000	2.24%	0.00%
Panasonic	W66LKV681XBARETSPD(I)	146.04	149.31	19000	19000	2.24%	0.00%
Panasonic	W66LKV781XBARETSPD(I)	146.04	149.31	19000	19000	2.24%	0.00%
Panasonic	W66LMK985XBARETSPD(I)	176.79	180.75	23000	23000	2.24%	0.00%
Panasonic	W76LAL581XBARETSPD(I)	315.14	322.20	41000	41000	2.24%	0.00%
Panasonic	W76LFC995X TBARETSPD(I)	311.30	318.27	40500	40500	2.24%	0.00%
Panasonic	W76LHQ681XBARETSPD(I)	295.93	302.55	38500	38500	2.24%	0.00%
Panasonic	W76LNR585XBARETSPD(I)	345.89	353.63	45000	45000	2.24%	0.00%
Panasonic	W86KYP881XBARETSPD(I)	461.18	471.51	60000	60000	2.24%	0.00%
Panasonic	W86LNR885XBARETSPD(I)	507.30	518.66	66000	66000	2.24%	0.00%
Panasonic	A60KTY095X TBARETSPD(U)	88.39	90.37	11500	11500	2.24%	0.00%
Panasonic	A60KTY095XBARETSPD(U)	88.39	90.37	11500	11500	2.24%	0.00%
Panasonic	M68KTY165X TBARETSPD(U)	149.88	153.24	19500	19500	2.24%	0.00%
Panasonic	M68KTY165XBARETSPD(U)	149.88	153.24	19500	19500	2.24%	0.00%
Panasonic	M68KTY188X TBARETSPD(U)	153.73	157.17	20000	20000	2.24%	0.00%
Panasonic	M68KTY188XBARETSPD(U)	153.73	157.17	20000	20000	2.24%	0.00%
Panasonic	M78KTY265X TBARETSPD(U)	353.57	361.49	46000	46000	2.24%	0.00%
Panasonic	M78KTY265XBARETSPD(U)	353.57	361.49	46000	46000	2.24%	0.00%

Note(s):

Willig's model number includes model number, finish, and customer name.

Data Source(s):

Exhibit 9_top 25 data observations.xlsx

all_defendants_dropexout_disaggregated.dta

tube_sales_data_compilation.dta

Source File(s):

FOREIGN_456.do

Top 25% of months_Exhibit 9 -- Price Movements by Region (North America vs. ROW) .do

monthly_diff_456_data.xlsx

December 1998 Month-to-Month Changes in USD and Local Currencies

Vendor	Willig's Model	US Dollars Willig		Local Currency		Month-to-Month Change	
		Nov-1998	Dec-1998	Nov-1998	Dec-1998	USD	Local
Panasonic	W66LKV081XBAREACER	170.11	181.50	21000	21000	6.70%	0.00%
Panasonic	A34JCD91XBAREDMD	47.79	50.99	5900	5900	6.70%	0.00%
Panasonic	A51JXS95XBAREDMD	84.73	90.41	10460	10460	6.70%	0.00%
Panasonic	W66LKV088XBAREHITACHI	131.63	140.45	16250	16250	6.70%	0.00%
Panasonic	W76LPX955XBAREHITACHI	364.52	388.94	45000	45000	6.70%	0.00%
Panasonic	W86LPX955XBAREHITACHI	567.03	605.01	70000	70000	6.70%	0.00%
Panasonic	A22JWG098XBAREJVC	85.14	90.84	10510	10510	6.70%	0.00%
Panasonic	M36JGK90XBAREJVC	87.63	93.50	10818	10818	6.70%	0.00%
Panasonic	M68LQL185XBAREJVC	210.61	224.72	26000	26000	6.70%	0.00%
Panasonic	W66LKV081XBAREJVC	136.39	145.52	16837	16837	6.70%	0.00%
Panasonic	W76LPX953XBAREJVC	356.42	380.29	44000	44000	6.70%	0.00%
Panasonic	W76LPX955XBARELG	421.22	449.44	52000	52000	6.70%	0.00%
Panasonic	W76LFC185X05ITCMELUK	341.06	363.91	42104	42104	6.70%	0.00%
Panasonic	W76LFC185X06ITCMELUK	340.22	363.01	42000	42000	6.70%	0.00%
Panasonic	W76LNR585X05ITCMELUK	400.97	419.19	49500	48500	4.54%	-2.02%
Panasonic	W76LPX555X05ITCMELUK	449.57	479.69	55500	55500	6.70%	0.00%
Panasonic	W86LPX555X05ITCMELUK	647.23	690.58	79900	79900	6.70%	0.00%
Panasonic	W56LCF061XBAREPSEC	105.31	112.36	13000	13000	6.70%	0.00%
Panasonic	M68LQL185XBARESANYO	202.51	216.08	25000	25000	6.70%	0.00%
Panasonic	W66LKV081XBARESANYO	131.63	140.45	16250	16250	6.70%	0.00%
Panasonic	W76LHQ081XBARESANYO	291.62	311.15	36000	36000	6.70%	0.00%
Panasonic	W66LMK985XBARETSPD(I)	174.16	185.83	21500	21500	6.70%	0.00%
Panasonic	W76LPX955XBARETSPD(I)	352.37	375.97	43500	43500	6.70%	0.00%
Panasonic	W86LPX555XBARETSPD(I)	550.83	587.73	68000	68000	6.70%	0.00%
Panasonic	W86LPX955XBARETSPD(I)	538.68	574.76	66500	66500	6.70%	0.00%
Panasonic	M68LQK185X TBARETSPD(U)	202.51	216.08	25000	25000	6.70%	0.00%
Panasonic	M68LQK185XBARETSPD(U)	202.51	216.08	25000	25000	6.70%	0.00%
Panasonic	M68LQL185X TBARETSPD(U)	202.51	216.08	25000	25000	6.70%	0.00%
Panasonic	M68LQL185XBARETSPD(U)	202.51	216.08	25000	25000	6.70%	0.00%
Panasonic	W66LKV081XBARETSPD(U)	133.66	142.61	16500	16500	6.70%	0.00%
Panasonic	W66LKV781XBARETSPD(U)	141.76	151.25	17500	17500	6.70%	0.00%
Panasonic	W76LHQ681XBARETSPD(U)	291.62	311.15	36000	36000	6.70%	0.00%
Panasonic	W76LPX955XBARETSPD(U)	352.37	375.97	43500	43500	6.70%	0.00%

Note(s):

Willig's model number includes model number, finish, and customer name.

Data Source(s):

Exhibit 9_top 25 data observations.xlsx

all_defendants_dropexout_disaggregated.dta

tube_sales_data_compilation.dta

Source File(s):

FOREIGN_467.do

Top 25% of months_Exhibit 9 -- Price Movements by Region (North America vs. ROW) .do

monthly_diff_467_data.xlsx

December 2000 Month-to-Month Changes in USD and Local Currencies

Vendor	Willig's Model	US Dollars Willig		Local Currency		Month-to-Month Change	
		Nov-2000	Dec-2000	Nov-2000	Dec-2000	USD	Local
Panasonic	A51JXS95XBAREDMD	94.02	91.15	10460	10460	-3.05%	0.00%
Panasonic	W86LPX955X-VBAREHITACHI	503.37	488.02	56000	56000	-3.05%	0.00%
Panasonic	W66LQL183XBAREJVC	152.81	148.15	17000	17000	-3.05%	0.00%
Panasonic	W76LPX955X-VBAREJVC	323.60	313.73	36000	36000	-3.05%	0.00%
Panasonic	M79LQM185X-HBARELG	458.43	444.44	51000	51000	-3.05%	0.00%
Panasonic	W86LPX955X07ITCMELUK	541.12	524.62	60200	60200	-3.05%	0.00%
Panasonic	W66LQL183XBAREMITSUBISHI	157.30	152.51	17500	17500	-3.05%	0.00%
Panasonic	M68LQK187X-HBAREPAVCAU	168.68	154.72	18766	17754	-8.28%	-5.39%
Panasonic	M79LQM187XBAREPAVCAU	432.84	419.64	48154	48154	-3.05%	0.00%
Panasonic	M68LQK185X-HBAREPAVCKM	157.34	152.54	17504	17504	-3.05%	0.00%
Panasonic	M68LQK185X-TBAREPAVCKM	157.34	152.54	17504	17504	-3.05%	0.00%
Panasonic	M68LQK186X-HBAREPAVCKM	157.34	152.54	17504	17504	-3.05%	0.00%
Panasonic	M68LQK187X-HBAREPAVCKM	157.34	152.54	17504	17504	-3.05%	0.00%
Panasonic	M68LQL185X-TBAREPAVCKM	157.34	152.54	17504	17504	-3.05%	0.00%
Panasonic	M68LQL186X-HBAREPAVCKM	157.34	152.54	17504	17504	-3.05%	0.00%
Panasonic	A60LQK285X-TBAREPAVCTH	123.74	119.97	13766	13766	-3.05%	0.00%
Panasonic	M68LQK186X-HBAREPAVCTH	159.14	154.28	17704	17704	-3.05%	0.00%
Panasonic	W86LPX955X-VBAREPHILIPS(BRUGGE)	610.34	584.31	67900	67050	-4.26%	-1.25%
Panasonic	W86LPX955X01ITCPHILIPS(BRUGGE)	693.03	671.90	77100	77100	-3.05%	0.00%
Panasonic	M79LQM185X01ITCPHILIPS(SUZHOU)	521.35	505.45	58000	58000	-3.05%	0.00%
Panasonic	M79LQM185X02ITCPHILIPS(SUZHOU)	521.35	505.45	58000	58000	-3.05%	0.00%
Panasonic	M68LQK187X-HBAREPMC	178.80	173.35	19892	19892	-3.05%	0.00%
Panasonic	M79LQM185X-HBAREANYO	449.44	435.73	50000	50000	-3.05%	0.00%
Panasonic	M68LQK185X-HBARETAMACO	159.14	154.28	17704	17704	-3.05%	0.00%
Panasonic	M68LQL185X-HBARETAMACO	159.14	154.28	17704	17704	-3.05%	0.00%
Panasonic	M68LQK185X-BBARETSPD(U)	157.30	152.51	17500	17500	-3.05%	0.00%
Panasonic	M68LQL185X-BBARETSPD(U)	157.30	152.51	17500	17500	-3.05%	0.00%
Panasonic	M79LQM185X-HBARETSPD(U)	426.97	413.94	47500	47500	-3.05%	0.00%
Panasonic	W66LQK185XBARETSPD(U)	166.29	161.22	18500	18500	-3.05%	0.00%
Panasonic	W66LQL185XBARETSPD(U)	166.29	161.22	18500	18500	-3.05%	0.00%
Panasonic	W76LPX955X-VBARETSPD(U)	319.10	309.37	35500	35500	-3.05%	0.00%
Panasonic	W86LPX955X-VBARETSPD(U)	507.87	492.37	56500	56500	-3.05%	0.00%
Panasonic	W76LPX955X91ITCXOCECO	413.48	400.87	46000	46000	-3.05%	0.00%

Note(s):

Willig's model number includes model number, finish, and customer name.

Data Source(s):

Exhibit 9_top 25 data observations.xlsx

all_defendants_dropexout_disaggregated.dta

tube_sales_data_compilation.dta

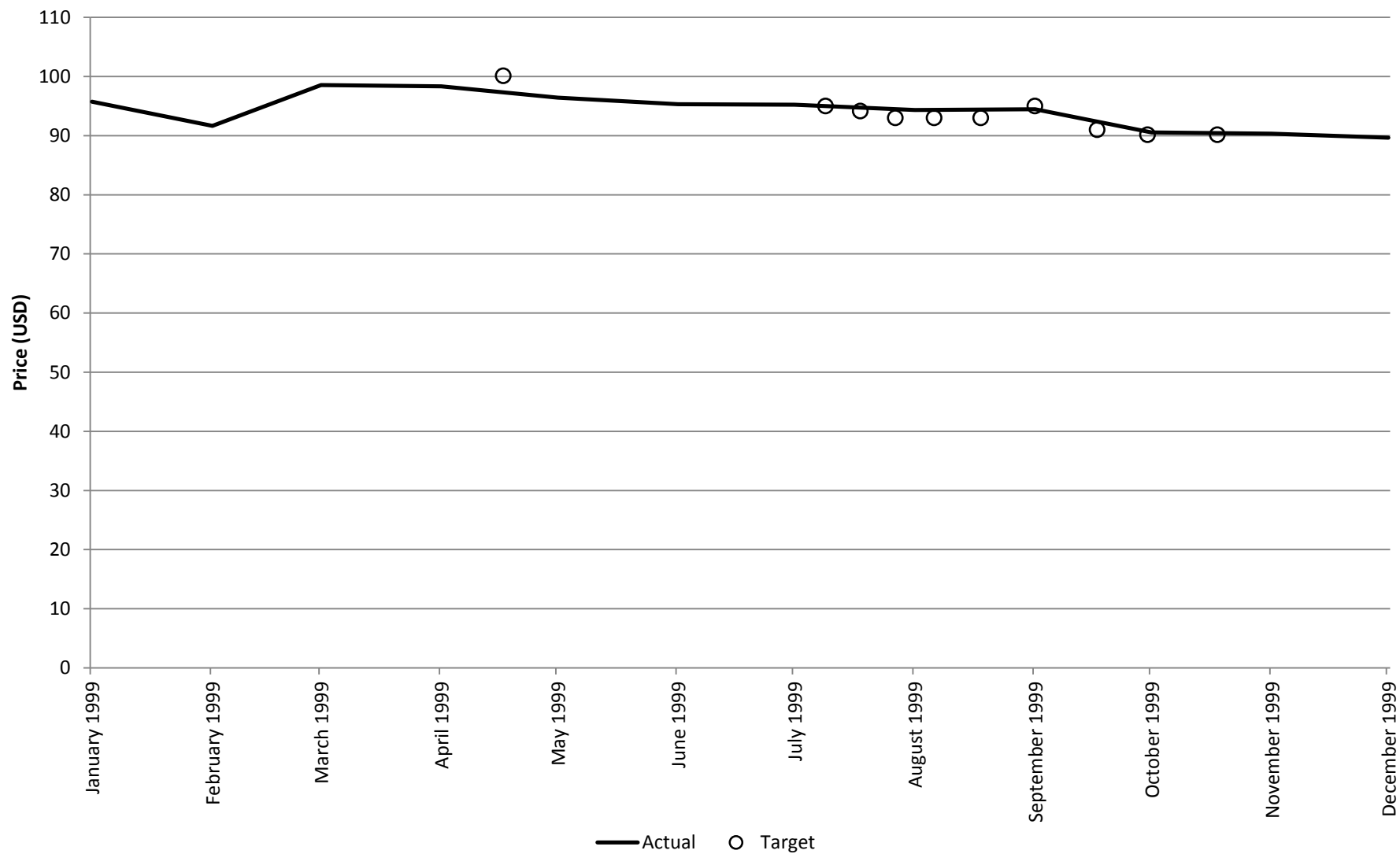
Source File(s):

FOREIGN_491.do

Top 25% of months_Exhibit 9 -- Price Movements by Region (North America vs. ROW) .do

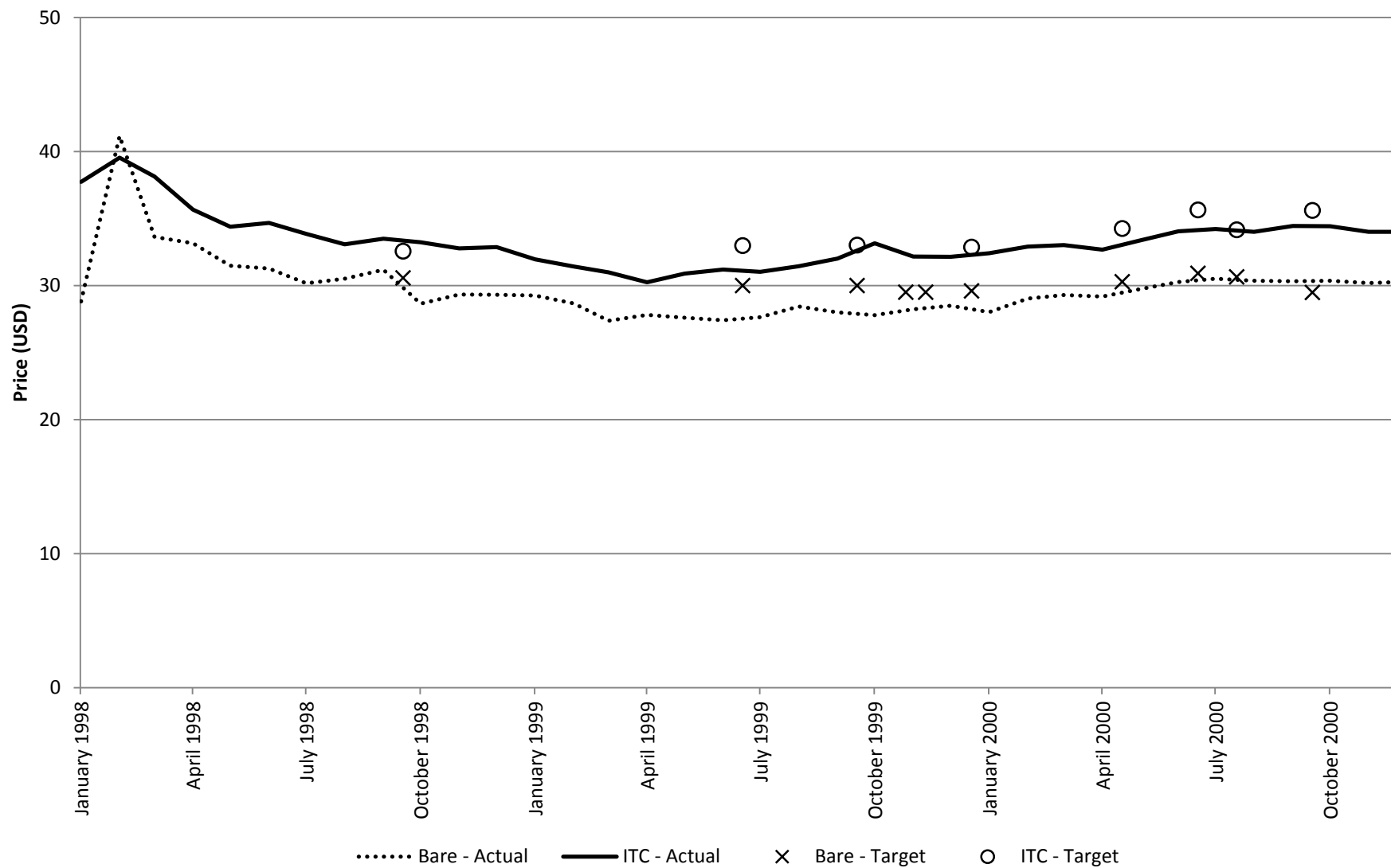
monthly_diff_491_data.xlsx

17-Inch ITC CDTs



Data Source(s): all_defendants_dropexout_collapsed.dta; Target price-structure.xlsx
 Source File(s): ActualTargetCharts.do

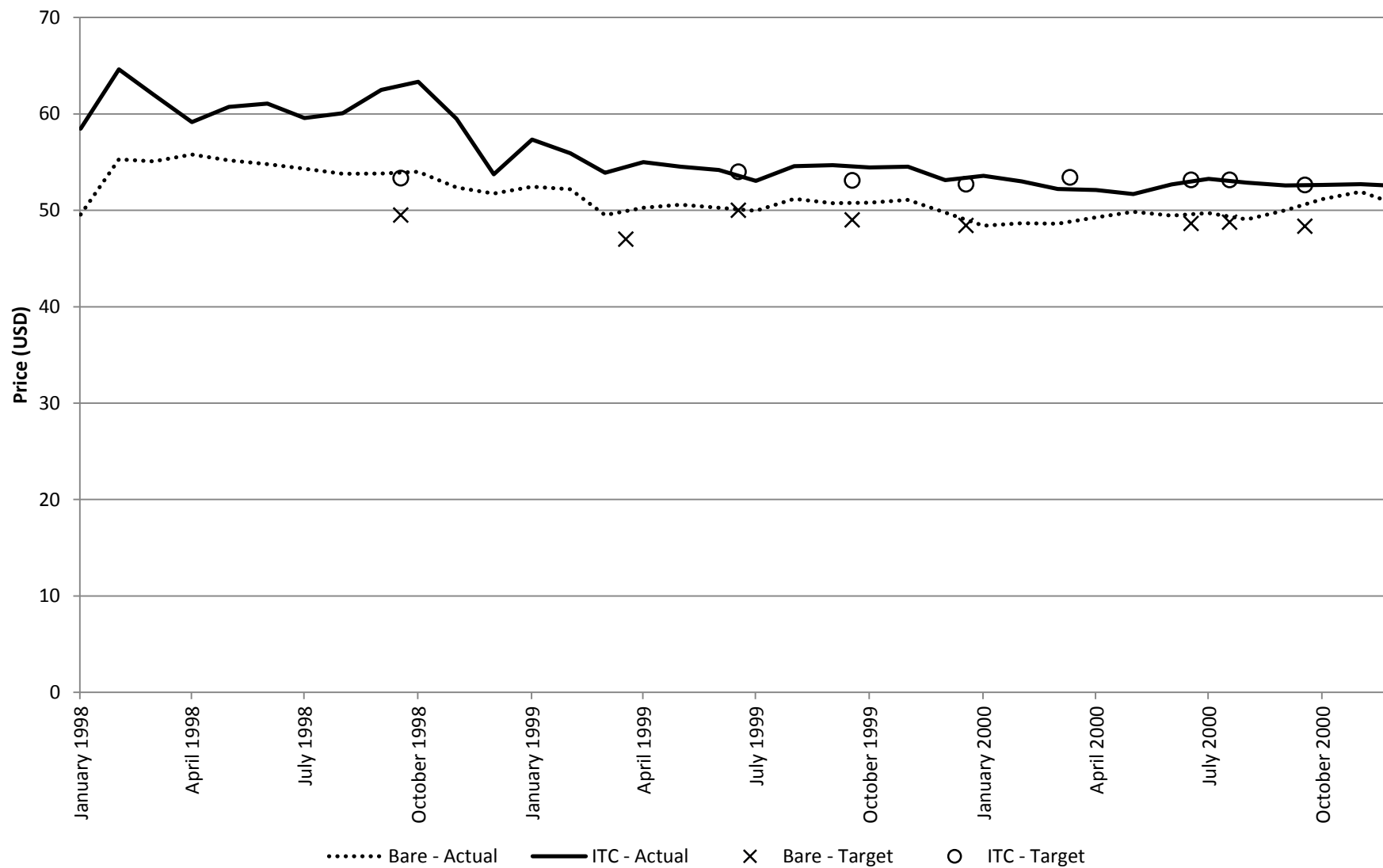
14-Inch CPTs: Bare and ITC



Data Source(s): all_defendants_dropexout_collapsed.dta; Target price-structure.xlsx

Source File(s): ActualTargetCharts.do

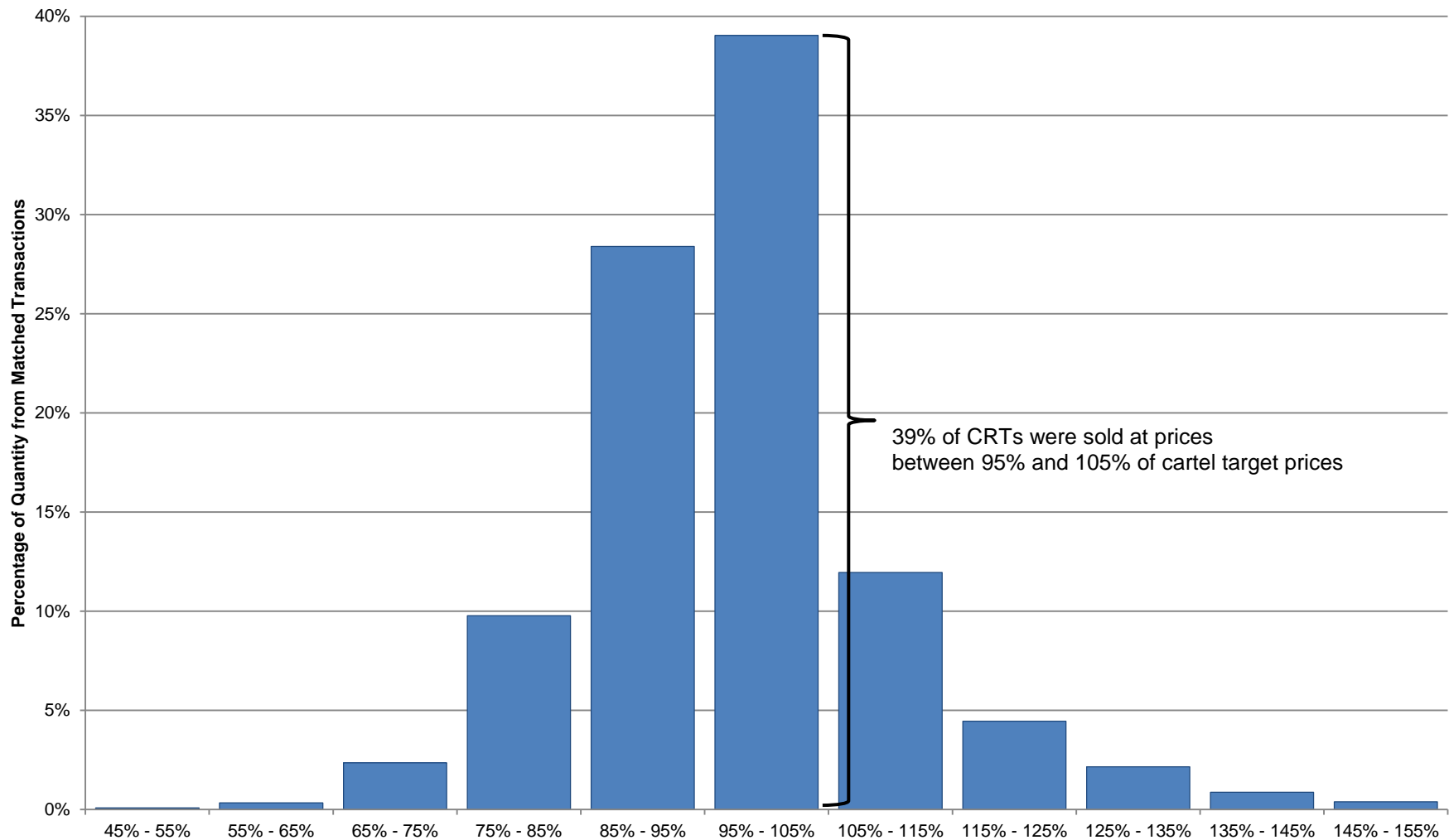
20-Inch CPTs: Bare and ITC



Data Source(s): all_defendants_dropexout_collapsed.dta; Target price-structure.xlsx
 Source File(s): ActualTargetCharts.do

Differences Between Sales Prices and Cartel Target Prices

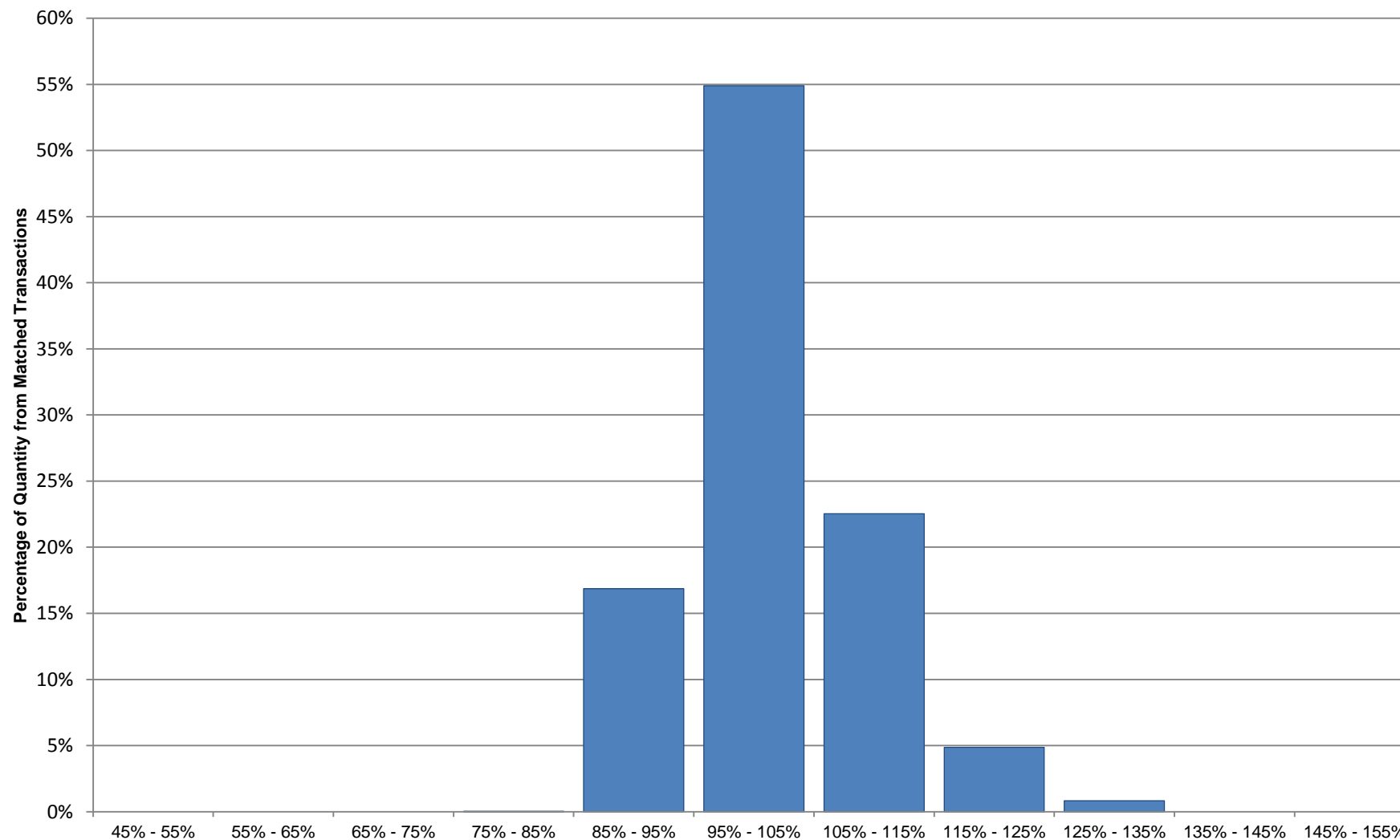
All Defendant Data Matched to Cartel Target Prices on Application, Size, and Finish



Data Source(s): all_defendants_dropexout_collapsed.dta, Target price-structure.xlsx
Source File(s): CleanDef.do; CleanTarget.do; PriceMatch.do

Differences Between Sales Prices and Cartel Target Prices of CRTs Sold in NAFTA Region

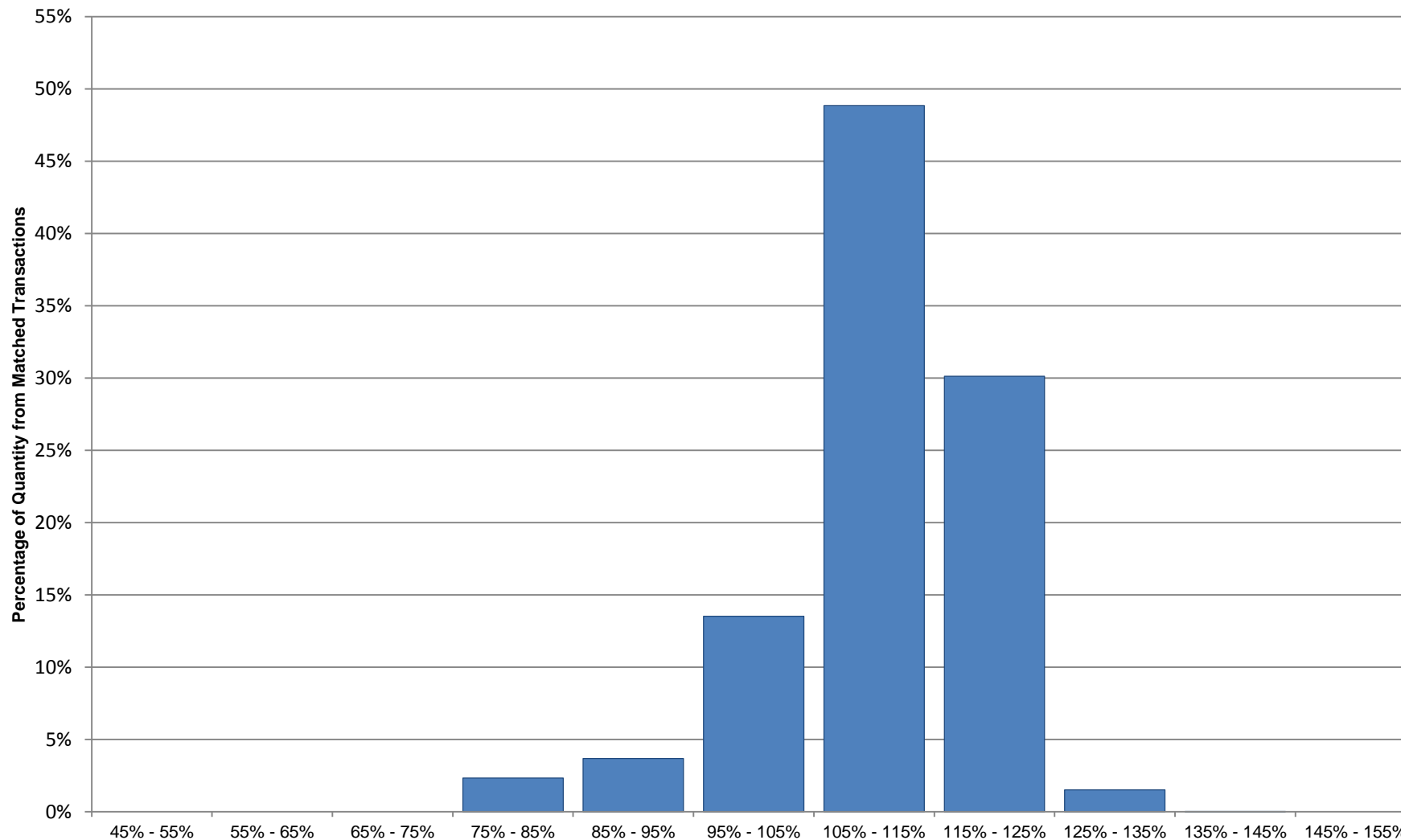
All Defendant Data Matched to Cartel Target Prices on Application, Size, Shape, and Finish



Data Source(s): tube_sales_data_compilation.dta, Target price-structure.xlsx
Source File(s): CleanDef_NAFTA.do; CleanTarget.do; PriceMatch.do

Differences Between Sales Prices and Cartel Target Prices of CRTs Manufactured in NAFTA Region

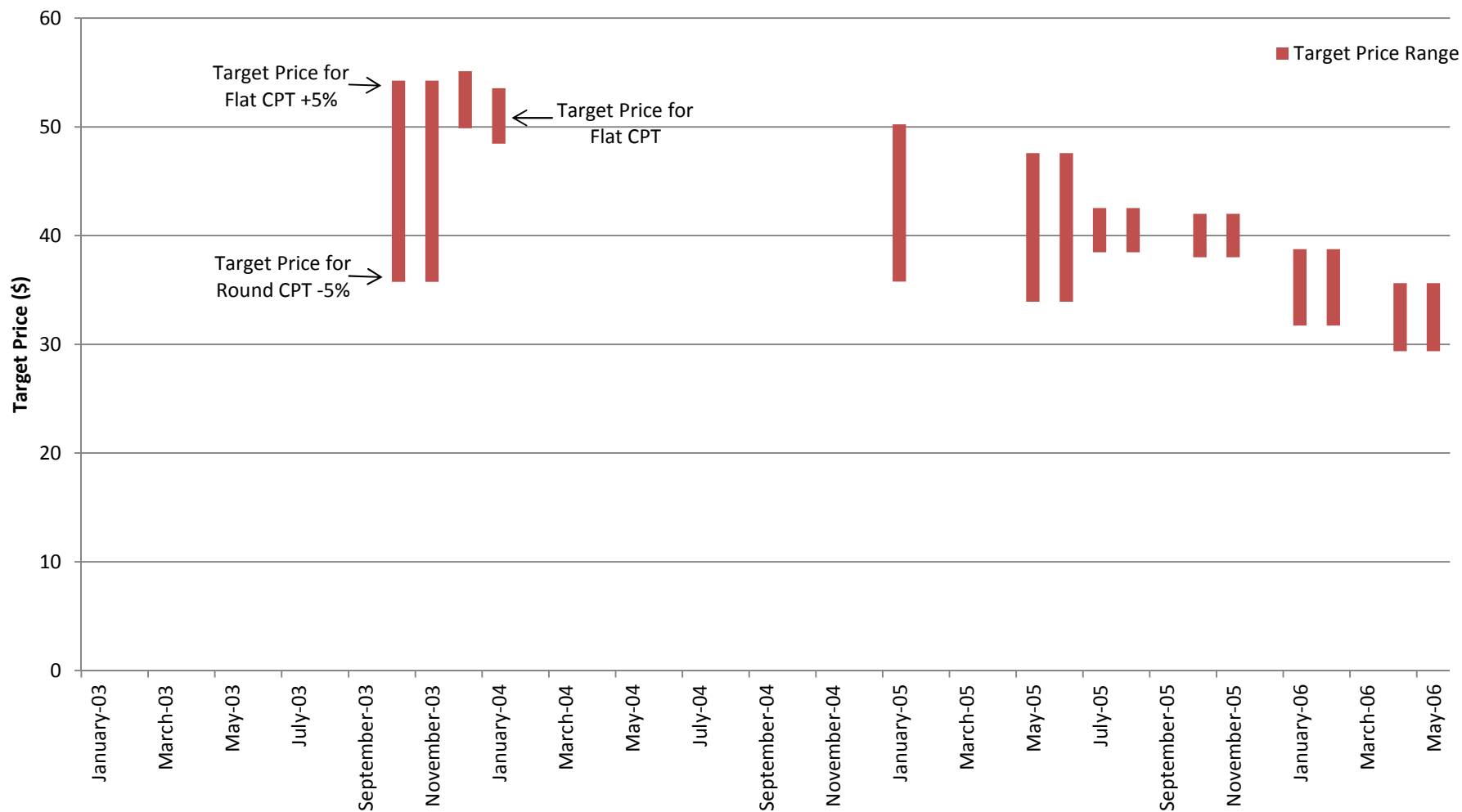
All Defendant Data Matched to Cartel Target Prices on Application, Size, Shape, and Finish



Data Source(s): all_defendants_dropexout_collapsed.dta, Target price-structure.xlsx

Source File(s): CleanDef.do; CleanTarget.do; PriceMatch.do

Target Price Ranges Used by Professor Willig in Exhibit 19 for 21-Inch Chunghwa ITC CPTs



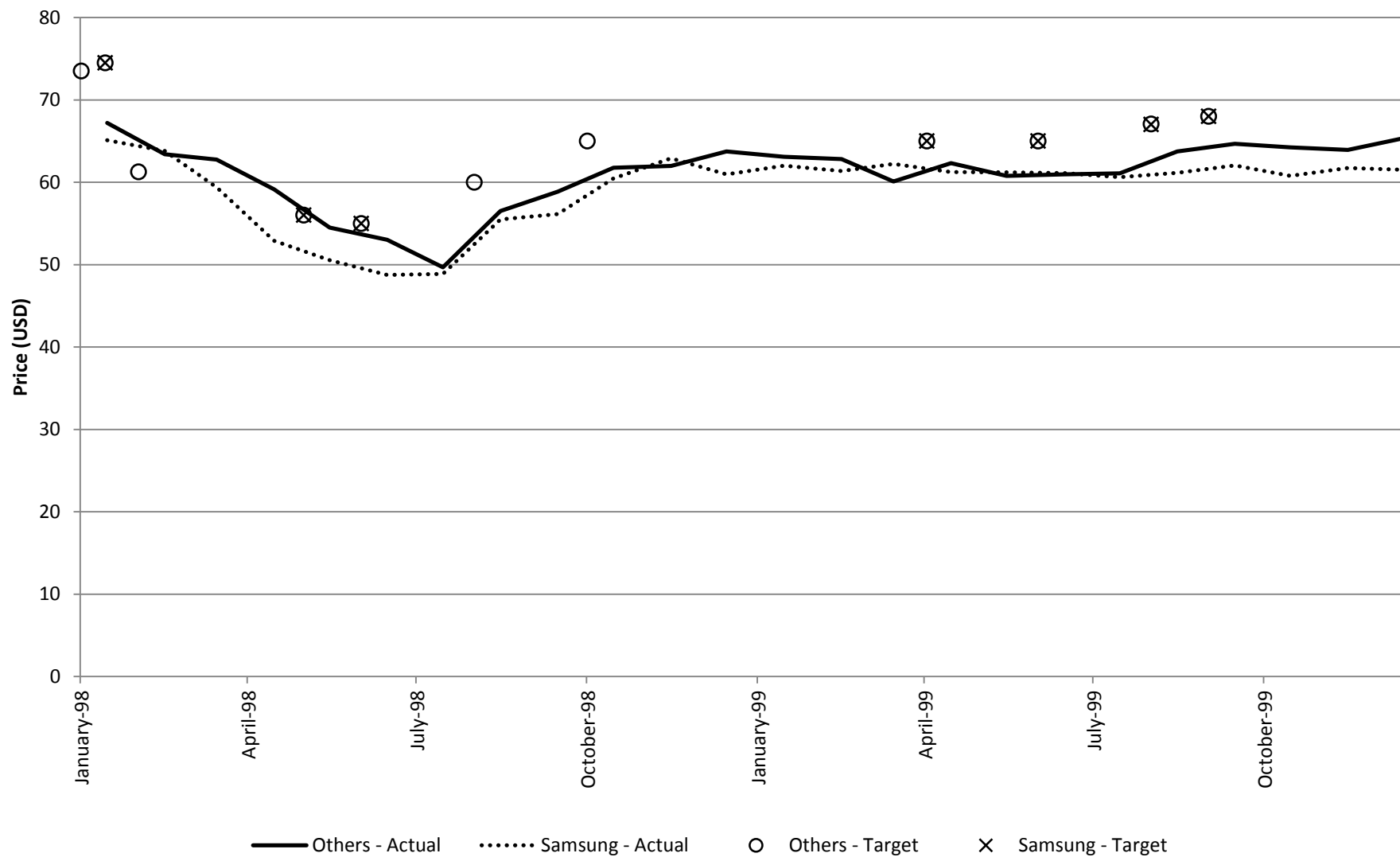
Note(s): This exhibit provides an example of the target price ranges that Professor Willig created for his Exhibit 19.

The +/- 5% represents +/- 5% of the mean target price.

Data Source(s): tube_sales_data_compilation.dta; Target price-structure.xlsx. (This version was produced for my original report and Willig Report.)

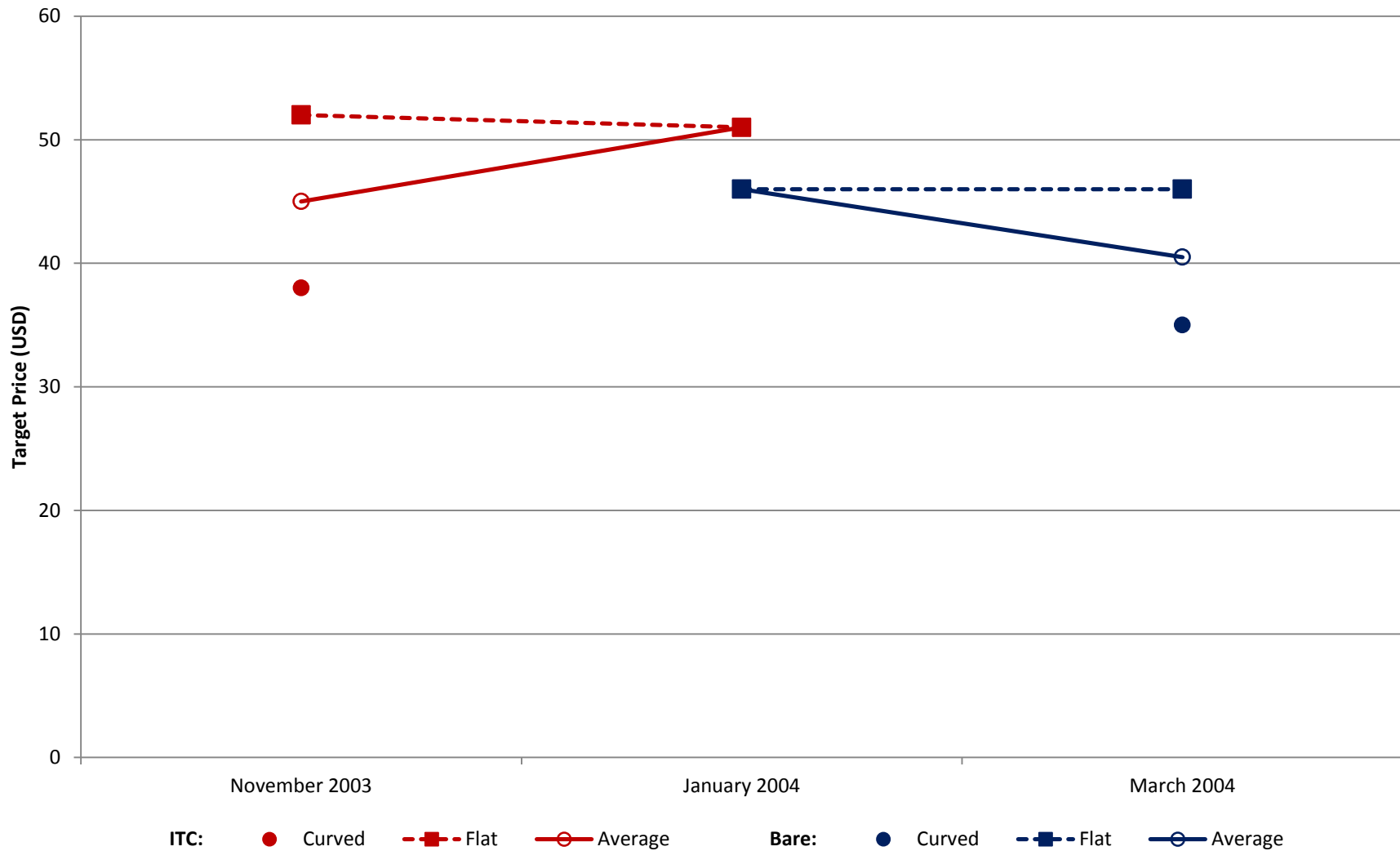
Source File(s): Willig Exhibit 19 Price Ranges for Floating Bar Charts.xlsx

15-Inch CDTs: Samsung and All Others



Data Source(s): all_defendants_dropexout_collapsed.dta; Target price-structure.xlsx
Source File(s): ActualTargetCharts.do

Creation of Artificial Target Price Changes Through Averaging



Data Source(s): Target price-structure.xlsx

Source File(s): Finding Prices Used for Price Changes Spreadsheet1.xlsx; Finding Prices Used for Price Changes Spreadsheet 2.xlsx; Willig Exhibit 17 -- Target v Actual Price Scatterplot Part 4 for Spreadsheet 1 for Finding Prices Used for Price Changes.do; Willig Exhibit 17 -- Target v Actual Price Scatterplot Part 4 for Spreadsheet 2 for Finding Prices Used for Price Changes.do

Target Price Data Hedonics Results - All CPT Data

Number of observations 2,565
 Total R-squared 0.9822

Dependant variable is log(price)

Independent Variable	Coefficient	Standard Error	p-value (two-sided)
Time trend	-0.0061	0.0004	0.000
Time trend squared	0.0000	0.0000	0.000
15-inch tube	0.1558	0.0054	0.000
20-inch tube	0.5104	0.0026	0.000
21-inch tube	0.5630	0.0033	0.000
25-inch tube	1.0670	0.0055	0.000
28-inch tube	1.3074	0.0057	0.000
29-inch tube	1.3007	0.0057	0.000
>29-inch tube	2.1428	0.0237	0.000
ITC	0.1039	0.0022	0.000
Shape	0.2088	0.0037	0.000
Major Customer	0.0168	0.0031	0.000
Constant	3.6659	0.0148	0.000

Data Source(s):

See Target price-structure.xlsx

Source File(s):

PriceTracker.do; hedonics_data.do; hedonics_final.do

Target Price Data Hedonics Results - All CDT Data

Number of observations 1,716
Total R-squared 0.9132

Dependant variable is log(price)

Independent Variable	Coefficient	Standard Error	p-value (two-sided)
Time trend	-0.0160	0.0005	0.000
Time trend squared	0.0000	0.0000	0.000
15-inch tube	0.3283	0.0100	0.000
17-inch tube	0.5914	0.0115	0.000
19-inch tube	0.9876	0.0128	0.000
Shape	0.0671	0.0052	0.000
Constant	4.4708	0.0122	0.000

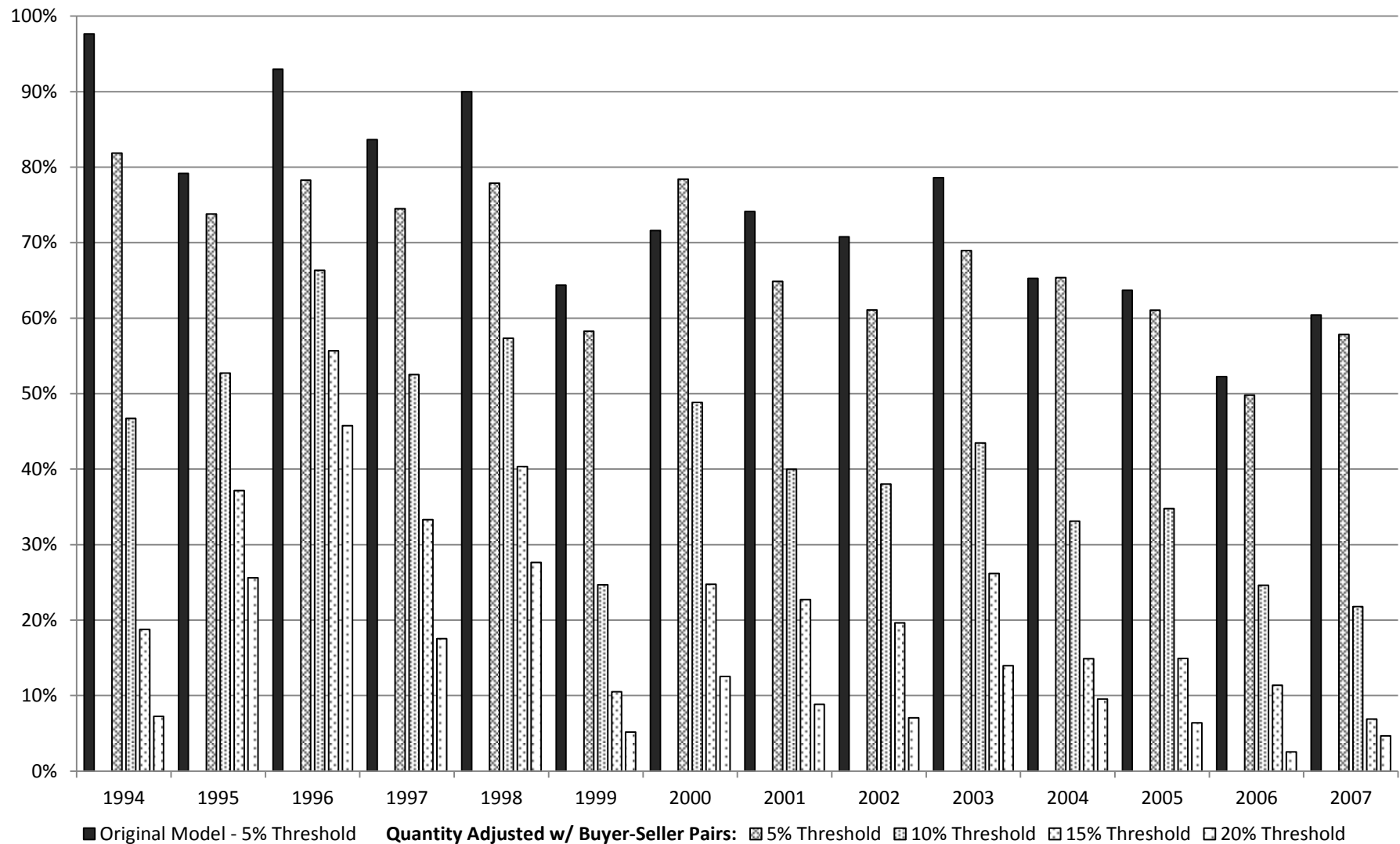
Data Source(s):

See Target price-structure.xlsx

Source File(s):

PriceTracker.do; hedonics_data.do; hedonics_final.do

**Share of Observations with Gap Between Actual and Predicted Prices Above Threshold (CDTs):
Alternative Model and Thresholds**

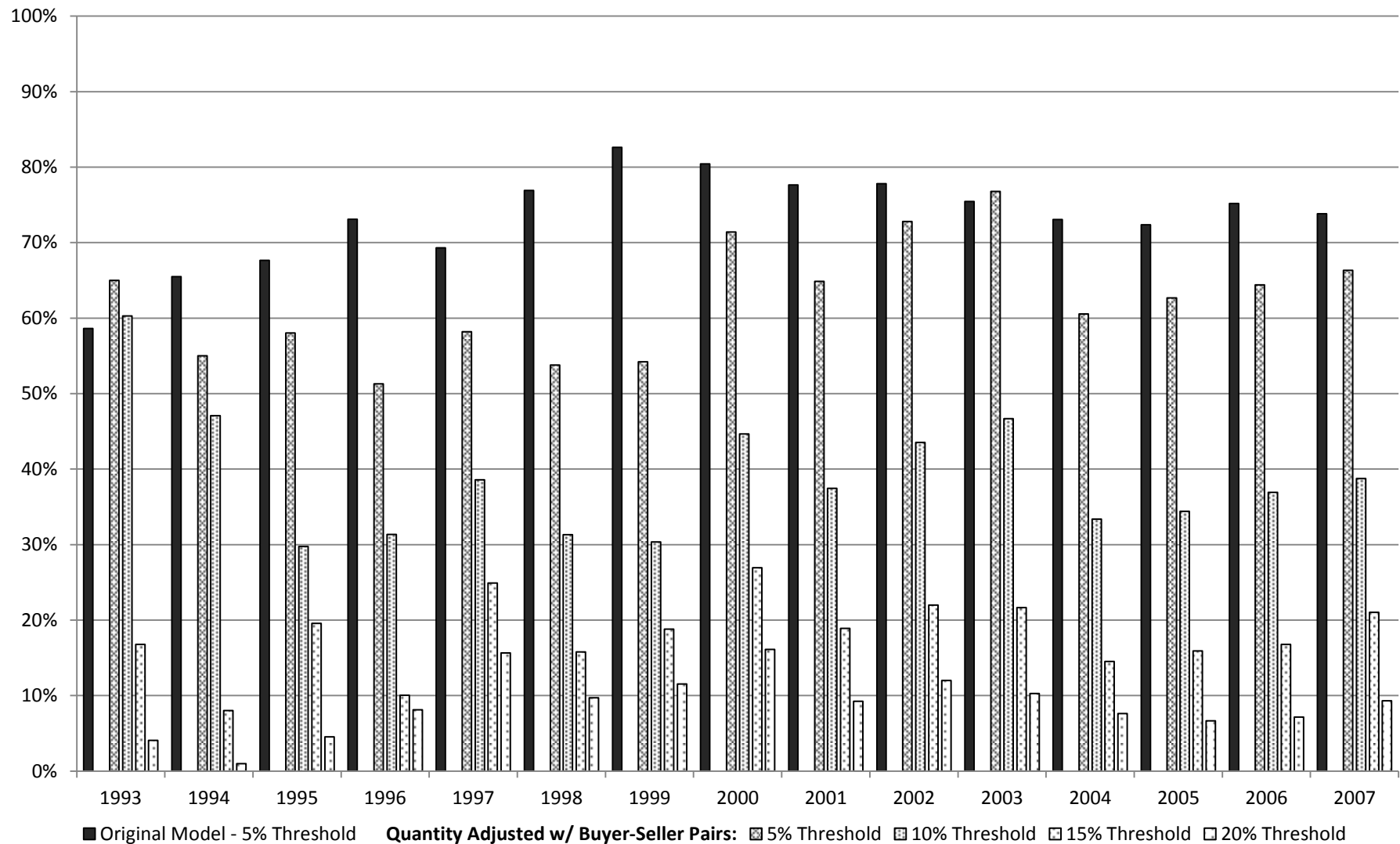


Note(s): This exhibit reproduces the Exhibit 14A from Professor Willig's report and reports additional results from an alternative model at different thresholds.

Data Source(s): all_defendants_dropexout.dta

Source File(s): Willig1415_response.do

**Share of Observations with Gap Between Actual and Predicted Prices Above Threshold (CPTs):
Alternative Model and Thresholds**



Note(s): This exhibit reproduces the Exhibit 15A from Professor Willig's report and reports additional results from an alternative model at different thresholds.

Data Source(s): all_defendants_dropexout.dta

Source File(s): Willig1415_response.do

Pass-Through Study Summary Results

Third Party Name	Distribution Chain Level	Product	Begin Date	End Date	Observations	Pass-through Coef.	Test Statistic (Coef. = 1.00)	p-Value (Coef. = 1.00)	Significance (Coef. = 1.00)	R-Squared	Standard Error of Pass-through Coef.	Using Robust Std. Errors
Amazon	Internet Retailer	Monitors	1/2/2002	11/16/2011	15,353	1.04	2.55	0.11		0.9796	0.0219	+
Amazon	Internet Retailer	Televisions	2/8/2002	1/7/2011	20,591	1.17	417.01	0.00	***	0.9714	0.0084	+
Arrow Electronics	Product Distributor	Monitors	11/24/1997	6/26/2006	70,703	1.09	1,743.25	0.00	***	0.9748	0.0021	+
BenQ	Product Manufacturer	Monitors	11/2/1998	9/21/2005	5,037,064	1.12	84,259.55	0.00	***	0.9518	0.0004	+
Best Buy	Brick & Mortar Retailer	Monitors	3/3/2002	11/12/2009	3,285,540	1.05	11,007.73	0.00	***	0.8586	0.0005	+
Best Buy	Brick & Mortar Retailer	Televisions	3/3/2002	12/27/2009	23,460,754	1.37	550,000.00	0.00	***	0.962	0.0005	+
Best Buy.com	Internet Retailer	Monitors	8/18/2000	12/29/2007	111,776	1.12	331.10	0.00	***	0.9596	0.0069	+
Best Buy.com	Internet Retailer	Televisions	6/12/2000	12/31/2007	451,192	1.14	1,423.18	0.00	***	0.9792	0.0038	+
Buy.com	Internet Retailer	Monitors	1/13/2002	1/28/2010	473	1.16	34.54	0.00	***	0.9945	0.0270	+
Buy.com	Internet Retailer	Televisions	9/27/2002	9/6/2010	575	1.05	55.56	0.00	***	0.9943	0.0066	+
CDW	Internet Retailer	Monitors	1/3/2006	1/8/2008	53,063	1.00	0.01	0.93		0.9325	0.0186	+
CDW	Internet Retailer	Televisions	11/8/2005	3/29/2010	5,721	1.02	0.54	0.46		0.9844	0.0279	+
Costco	Brick & Mortar Retailer	Monitors	12/16/1996	3/11/2006	569,177	1.07	29,992.74	0.00	***	0.9907	0.0004	+
Costco	Brick & Mortar Retailer	Televisions	9/3/1996	12/8/2007	7,325,920	1.07	120,000.00	0.00	***	0.994	0.0002	+
Dell	Internet Retailer	Monitors	1/1/2002	12/31/2006	20,102,240	1.26	220,000.00	0.00	***	0.8169	0.0005	+
Fry's	Brick & Mortar Retailer	Monitors	1/1/1998	10/21/2006	1,205,681	1.13	20,095.86	0.00	***	0.9685	0.0009	+
Funai	Product Manufacturer	Televisions	1/3/2005	7/28/2009	10,958,577	1.13	450,000.00	0.00	***	0.9695	0.0002	+
Gateway	Internet Retailer	Monitors	1/5/1998	12/30/2004	582	1.12	90.41	0.00	***	0.9837	0.0124	+
Ingram Micro	Product Distributor	Monitors	12/31/2001	12/27/2010	2,646,991	1.02	5,997.89	0.00	***	0.9969	0.0003	+
Ingram Micro	Product Distributor	Televisions	12/31/2001	12/7/2010	4,960	1.03	22.19	0.00	***	0.9987	0.0070	+
Kmart	Brick & Mortar Retailer	Televisions	11/25/2004	11/19/2009	1,411,204	1.15	3,838.71	0.00	***	0.9492	0.0025	+
OfficeMax	Brick & Mortar Retailer	Desktops	1/26/2003	12/1/2008	90,747	1.09	11.49	0.00	***	0.792	0.0258	+
OfficeMax	Brick & Mortar Retailer	Monitors	1/26/2003	9/25/2007	231,359	1.01	6.63	0.01	**	0.7746	0.0051	+
PC Connection	Internet Retailer	Monitors	7/8/1999	10/29/2008	23,101	1.09	102.55	0.00	***	0.9786	0.0086	+
PC Connection	Internet Retailer	Televisions	2/5/1999	1/8/2007	232	1.06	14.12	0.00	***	0.9962	0.0166	+
PC Mall	Internet Retailer	Desktops	6/6/2002	3/7/2006	5,638	1.01	0.55	0.46		0.9451	0.0122	+
PC Mall	Internet Retailer	Monitors	2/27/1994	6/18/2009	159,587	1.10	3,468.15	0.00	***	0.9822	0.0017	+
PC Mall	Internet Retailer	Televisions	9/24/1996	11/19/2009	2,001	1.12	25.13	0.00	***	0.9924	0.0245	+
RadioShack	Brick & Mortar Retailer	Monitors	1/1/2002	7/4/2009	165,573	1.08	1,787.76	0.00	***	0.841	0.0019	+
RadioShack	Brick & Mortar Retailer	Televisions	1/1/2002	6/1/2008	1,107,292	1.04	229.09	0.00	***	0.8931	0.0029	+
Sam's Club (Retail Prices)	Brick & Mortar Retailer	Televisions	8/13/2001	11/19/2005	1,481	0.98	0.95	0.33		0.9998	0.0213	+
Sam's Club (Transaction Prices)	Brick & Mortar Retailer	Televisions	9/8/2001	12/17/2005	15,871	1.13	24.87	0.00	***	0.983	0.0268	+
Sears	Brick & Mortar Retailer	Monitors	1/5/1999	12/28/2005	769,923	0.99	1.56	0.21		0.7098	0.0054	+
Sears	Brick & Mortar Retailer	Televisions	1/5/1999	1/14/2009	13,425,751	1.28	90,137.23	0.00	***	0.944	0.0009	+
Tatung	Product Manufacturer	Monitors	9/2/1998	10/31/2006	222,516	1.00	0.55	0.46		0.9253	0.0059	+
Tech Data	Product Distributor	Monitors	11/3/1997	10/29/2007	1,217,901	1.00	23.32	0.00	***	0.991	0.0005	+
Toshiba America Consumer Products (TACP)	Product Manufacturer	Televisions	4/10/1995	3/31/2006	21,713,445	1.16	380,000.00	0.00	***	0.9727	0.0003	+
Toshiba America Electronics Corporation	Tube Distributor	CDTs	4/23/1994	6/30/2000	1,881,430	0.96	3.72	0.05	*	0.9945	0.0210	++
Toshiba America Electronics Corporation	Tube Distributor	CPTs	4/19/1994	11/22/2002	13,237,937	1.00	4.45	0.04	**	0.9999	0.0015	++
Toshiba America Information Systems	Product Manufacturer	Monitors	11/1/1996	4/1/2005	4,171	1.12	0.75	0.39		0.7731	0.1411	+
Wal-Mart (Retail Prices)	Brick & Mortar Retailer	Televisions	6/23/2001	8/7/2010	1,277	1.10	4.52	0.03	**	0.9894	0.0460	+
Wal-Mart (Transaction Prices)	Brick & Mortar Retailer	Televisions	6/25/2001	8/7/2010	47,141	1.06	12.40	0.00	***	0.9863	0.0180	+
Wal-Mart/Sanyo	Brick & Mortar Retailer	Televisions	12/1/1994	8/3/2009	243	1.16	174.99	0.00	***	0.9977	0.0121	+
Zones	Internet Retailer	Desktops	1/3/2000	4/1/2003	7,175	1.13	464.03	0.00	***	0.9665	0.0060	+
Zones	Internet Retailer	Monitors	1/3/2000	1/11/2008	41,370	1.04	92.40	0.00	***	0.9712	0.0047	+
Toshiba	Top-to-bottom	Televisions	9/3/1996	2/28/2006	0	1.02	1.71	0.09	*		0.0143	+
DisplaySearch	Top-and-bottom	Televisions	2/15/2004	2/15/2006	1,326	1.24	2.98	0.08	*	0.8267	0.1385	+

Note(s):

Unless otherwise noted, the number of observations is weighted by the transaction quantity. Studies that are not weighted by transaction quantity are Gateway, Wal-Mart/Sanyo, and the DisplaySearch Top-and-Bottom study.

Cost data is generally produced in two forms: synchronized with the sales data, or separate from the sales data. Synchronized cost data appears in the sales data as a separate field and does not need to be matched with sales data.

When costs and prices (i.e. purchases and sales) are not synchronized, I calculate average costs for each product over a certain time (generally daily or weekly average costs).

Where possible, I also conduct pass-through studies on desktop computers that are all-in-one computers featuring a built-in CRT monitor, or that are bundled with CRT monitors.

The Wal-Mart/Sanyo study uses price lists of Sanyo products sold in Wal-Mart stores. The price variable is Wal-Mart's retail price, and the cost variable is FOB costs from products sold by Sanyo Manufacturing Corporation to Wal-Mart.

The columns Begin Date and End Date represent the oldest and most recent dates for all observations in each study.

I have also modified pass-through studies for Best Buy and Dell, which are not reported here. See Appendix A.

Highlighted rows indicate new or updated pass-through studies. Best Buy.com, Kmart, RadioShack, and Sears are all new studies; TACP is an updated study.

++ designates that robust standard errors are used, i.e. I conducted a Breusch-Pagan test for heteroskedasticity and this rejected the null hypothesis of no heteroskedasticity.

++ designates that standard errors allow for clustering (correlation between observations within each cluster) are used.

* designates that the pass-through coefficient is statistically significantly different than 100% at the 0.10 level.

** designates that the pass-through coefficient is statistically significantly different than 100% at the 0.05 level.

*** designates that the pass-through coefficient is statistically significantly different than 100% at the 0.01 level.

Source File(s):

See Exhibit RR-36

Pass-Through Study Explanatory Variable List

Third Party Name	Distribution Chain Level	Product	Price Description	Cost Description	Cost	Size	Manufacturer / Brand	Resolution	Flat Screen	HDTV	VCR Combo	DVD Combo	Time	Other Explanatory Variables
Amazon	Internet Retailer	Monitors	Transaction Prices	Synchronized	X	X	X	X						
Amazon	Internet Retailer	Televisions	Transaction Prices	Synchronized	X	X	X			X		X		
Arrow Electronics	Product Distributor	Monitors	Transaction Prices	Synchronized	X	X		X						
BenQ	Product Manufacturer	Monitors	Transaction Prices	Synchronized	X	X		X						
Best Buy	Brick & Mortar Retailer	Monitors	Transaction Prices	Synchronized	X	X			X					Wide screen.
Best Buy	Brick & Mortar Retailer	Televisions	Transaction Prices	Synchronized	X	X			X	X	X	X		Wide screen; HD-ready; Picture-in-picture.
Best Buy.com	Internet Retailer	Monitors	Transaction Prices	Synchronized	X	X	X		X					
Best Buy.com	Internet Retailer	Televisions	Transaction Prices	Synchronized	X	X	X		X	X	X	X		Wide screen; HD-ready; Picture-in-picture; Slim tube.
Buy.com	Internet Retailer	Monitors	Transaction Prices	Synchronized	X	X	X	X	X					
Buy.com	Internet Retailer	Televisions	Transaction Prices	Synchronized	X	X	X		X	X	X	X		
CDW	Internet Retailer	Monitors	Transaction Prices	Monthly Average	X	X		X	X					
CDW	Internet Retailer	Televisions	Transaction Prices	Monthly Average	X	X	X		X	X	X	X		
Costco	Brick & Mortar Retailer	Monitors	Transaction Prices	Weekly Average	X	X	X		X					
Costco	Brick & Mortar Retailer	Televisions	Transaction Prices	Weekly Average	X	X	X		X	X	X	X		Wide screen; HD-ready; Picture-in-picture.
Dell	Internet Retailer	Monitors	Transaction Prices	Synchronized	X	X		X						
Fry's	Brick & Mortar Retailer	Monitors	Transaction Prices	Synchronized	X	X	X		X					Refurbished.
Funai	Product Manufacturer	Televisions	Transaction Prices	Monthly Average	X	X	X		X		X	X		
Gateway	Internet Retailer	Monitors	List Prices	Daily Average	X	X								
Ingram Micro	Product Distributor	Monitors	Transaction Prices	Synchronized	X	X		X	X					
Ingram Micro	Product Distributor	Televisions	Transaction Prices	Synchronized	X	X			X	X				Wide screen.
Kmart	Brick & Mortar Retailer	Televisions	Transaction Prices	Weekly Average	X	X	X		X	X	X	X		
OfficeMax	Brick & Mortar Retailer	Desktops	Transaction Prices	Synchronized	X									RAM; Hard Drive Size; Processor Type; Processor Speed; Condition Type; Distribution Channel
OfficeMax	Brick & Mortar Retailer	Monitors	Transaction Prices	Synchronized	X	X			X					Condition Type; Distribution Channel.
PC Connection	Internet Retailer	Monitors	Transaction Prices	Weekly Average	X	X	X	X	X					Refurbished.
PC Connection	Internet Retailer	Televisions	Transaction Prices	Weekly Average	X	X	X			X				HD-ready.
PC Mall	Internet Retailer	Desktops	Transaction Prices	Weekly Average	X									RAM; Processor Speed; Retailer (PC Mall, Trend)
PC Mall	Internet Retailer	Monitors	Transaction Prices	Weekly Average	X	X		X	X					Refurbished; Retailer (PC Mall, Trend, SX)
PC Mall	Internet Retailer	Televisions	Transaction Prices	Weekly Average	X	X			X	X	X	X		Retailer (PC Mall, Trend)
RadioShack	Brick & Mortar Retailer	Monitors	Transaction Prices	Synchronized	X	X	X		X					
RadioShack	Brick & Mortar Retailer	Televisions	Transaction Prices	Synchronized	X	X	X		X		X	X		
Sam's Club (Retail Prices)	Brick & Mortar Retailer	Televisions	Weekly Average Prices	Weekly Average	X	X	X				X			
Sam's Club (Transaction Prices)	Brick & Mortar Retailer	Televisions	Transaction Prices	Weekly Average	X	X	X				X		Month	
Sears	Brick & Mortar Retailer	Monitors	Transaction Prices	Synchronized	X	X	X							
Sears	Brick & Mortar Retailer	Televisions	Transaction Prices	Synchronized	X	X	X				X	X		
Tatung	Product Manufacturer	Monitors	Transaction Prices	Monthly Average	X	X		X					Year	Color Display
Tech Data	Product Distributor	Monitors	Transaction Prices	Monthly Average	X	X		X	X					Speakers; Unbranded (generic).
Toshiba America Consumer Products (TACP)	Product Manufacturer	Televisions	Transaction Prices	Synchronized	X	X				X	X			Model Number
Toshiba America Electronics Corporation	Tube Distributor	CDTs	Transaction Prices	Monthly Average	X									Model Number
Toshiba America Electronics Corporation	Tube Distributor	CPTs	Transaction Prices	Monthly Average	X									Remanufactured; Obsolete; Discounted; Limited; Product Line; Multimedia; Casing Color
Toshiba America Information Systems	Product Manufacturer	Monitors	Monthly Average Prices	Monthly Average	X	X								
Wal-Mart (Retail Prices)	Brick & Mortar Retailer	Televisions	Weekly Average Prices	Weekly Average	X	X	X			X	X			
Wal-Mart (Transaction Prices)	Brick & Mortar Retailer	Televisions	Transaction Prices	Weekly Average	X	X	X			X	X		Month	
Wal-Mart/Sanyo	Brick & Mortar Retailer	Televisions	List Prices	FOB Costs	X	X			X	X				Wide screen, Picture-in-picture.
Zones	Internet Retailer	Desktops	Transaction Prices	Synchronized	X									RAM; Processor Speed
Zones	Internet Retailer	Monitors	Transaction Prices	Synchronized	X	X	X	X	X					
Toshiba	Top-to-bottom	Televisions	Transaction Prices	Monthly Average	X	X			X		X			Picture-in-picture.
DisplaySearch	Top-and-bottom	Televisions	Monthly Average Prices	Monthly Average	X	X	X		X	X				

Note(s):

Cost data is generally produced in two forms: synchronized with the sales data, or separate from the sales data.

When costs and prices (i.e. purchases and sales) are not synchronized, I calculate average costs for each product over a certain time (generally daily or weekly average costs).

Where possible, I also conduct pass-through studies on desktop computers that are all-in-one computers featuring a built-in CRT monitor, or that are bundled with CRT monitors.

The Wal-Mart/Sanyo study uses price lists of Sanyo products sold in Wal-Mart stores. The price variable is Wal-Mart's retail price, and the cost variable is FOB costs from products sold by Sanyo Manufacturing Corporation to Wal-Mart.

Highlighted rows indicate new or updated pass-through studies.

Source File(s):

See Exhibit RR-36.

Pass-Through Stata File List

Study Name	Stata Program Names
Amazon	Import Amazon Specs.do amazon_data_cleaning.do amazon_report.do
Arrow	arrow_data_cleaning.do arrow_report.do
BenQ	benq_customer_list.do benq_data_cleaning.do benq_report.do
Best Buy	bestbuy_data_load.do bestbuy_data_cleaning.do bestbuy_report.do bestbuy_data_cleaning_modified.do bestbuy_report_modified.do
Best Buy.com	bestbuy_com_data_load.do bestbuy_com_data_clean.do bestbuy_com_report.do
Buy.com	Import BuyCom Digests.do ReadSKUs.do buycom_data_cleaning.do buycom_report.do
CDW	cdw_data_cleaning.do cdw_report.do
Costco	costco_data_load.do costco_data_cleaning.do costco_report.do
Dell	dell_data_load.do dell_data_cleaning.do dell_report.do
Fry's	frys_data_cleaning.do frys_report.do
Funai	funai_data_cleaning.do funai_report.do
Gateway	gateway_data_cleaning.do gateway_report.do
Ingram Micro	ingram_micro_data_load.do ingram_micro_data_cleaning.do ingram_micro_report.do
Kmart	kmart_data_load.do kmart_data_clean.do kmart_report.do
OfficeMax	item_selection.do officemax_data_cleaning.do officemax_report.do

PC Connection	pcconnection_data_cleaning.do pcconnection_report.do
PC Mall	pcmall_data_cleaning.do pcmall_report.do
RadioShack	radioshack_data_load.do radioshack_data_clean.do radioshack_report.do
Wal-Mart/Sanyo	sanyo_data_cleaning.do sanyo_report.do
Toshiba America Consumer Products (TACP)	tacp_sales_load.do tacp_sales_clean.do tacp_report.do
Toshiba America Electronic Components (TAEC)	taec_data_load.do taec_report.do
Toshiba America Information Systems (TAIS)	tais_sales.do tais_report.do
Tatung	tatung_costs.do tatung_sales.do tatung_report.do
Tech Data	techdata_data_cleaning.do techdata_report.do
Sam's Club (Retail Prices)	selected_stores.do selected_items.do additional_wm_sams_skus.do sams_retail_prices.do sams_retail_prices_report.do
Sam's Club (Transaction Prices)	selected_stores.do selected_items.do additional_wm_sams_skus.do sams_data_cleaning.do sams_report.do
Sears	sears_data_load.do sears_data_clean.do sears_add_date.do sears_report.do
Wal-Mart (Retail Prices)	selected_stores.do selected_items.do additional_wm_sams_skus.do walmart_retail_prices.do walmart_retail_prices_report.do
Wal-Mart (Transaction Prices)	selected_stores.do selected_items.do additional_wm_sams_skus.do walmart_data_cleaning.do walmart_report.do

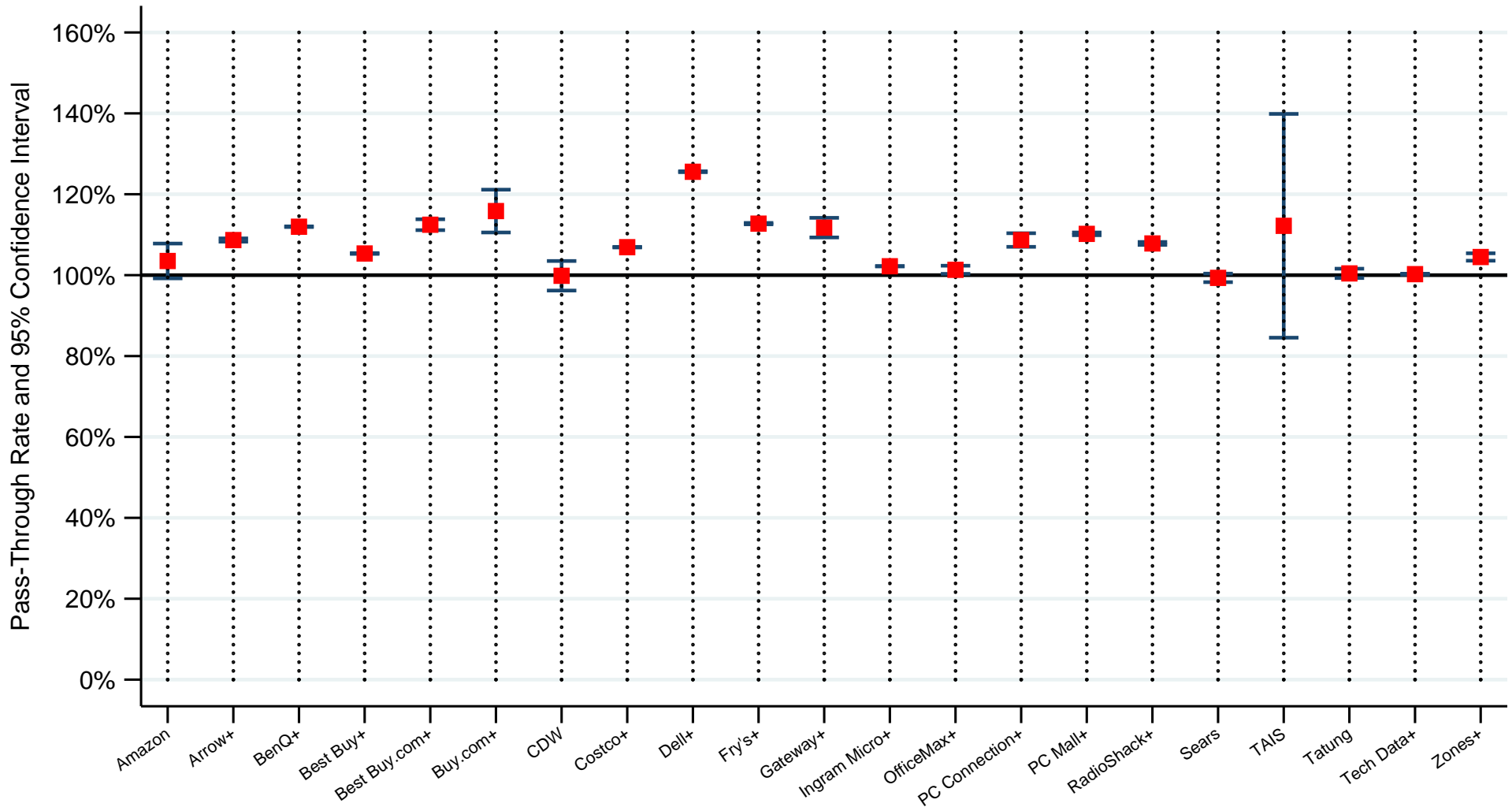
Zones	zones_item_selection.do zones_data_cleaning.do zones_report.do
Top-to-Bottom: Toshiba	taec_data_load.do tacp_sales_load.do tacp_sales_clean.do costco_data_load.do costco_data_cleaning.do toshiba_top_to_bottom.do
Top-and-Bottom: DisplaySearch	all_defendants_price.do displaysearch_top_and_bottom_tvs.do displaysearch_top_and_bottom_tvs_report.do

Note(s):

Programs are listed in the order they should be run.

Monitor Pass-Through

Calculated Pass-Through Rates and 95% Confidence Intervals

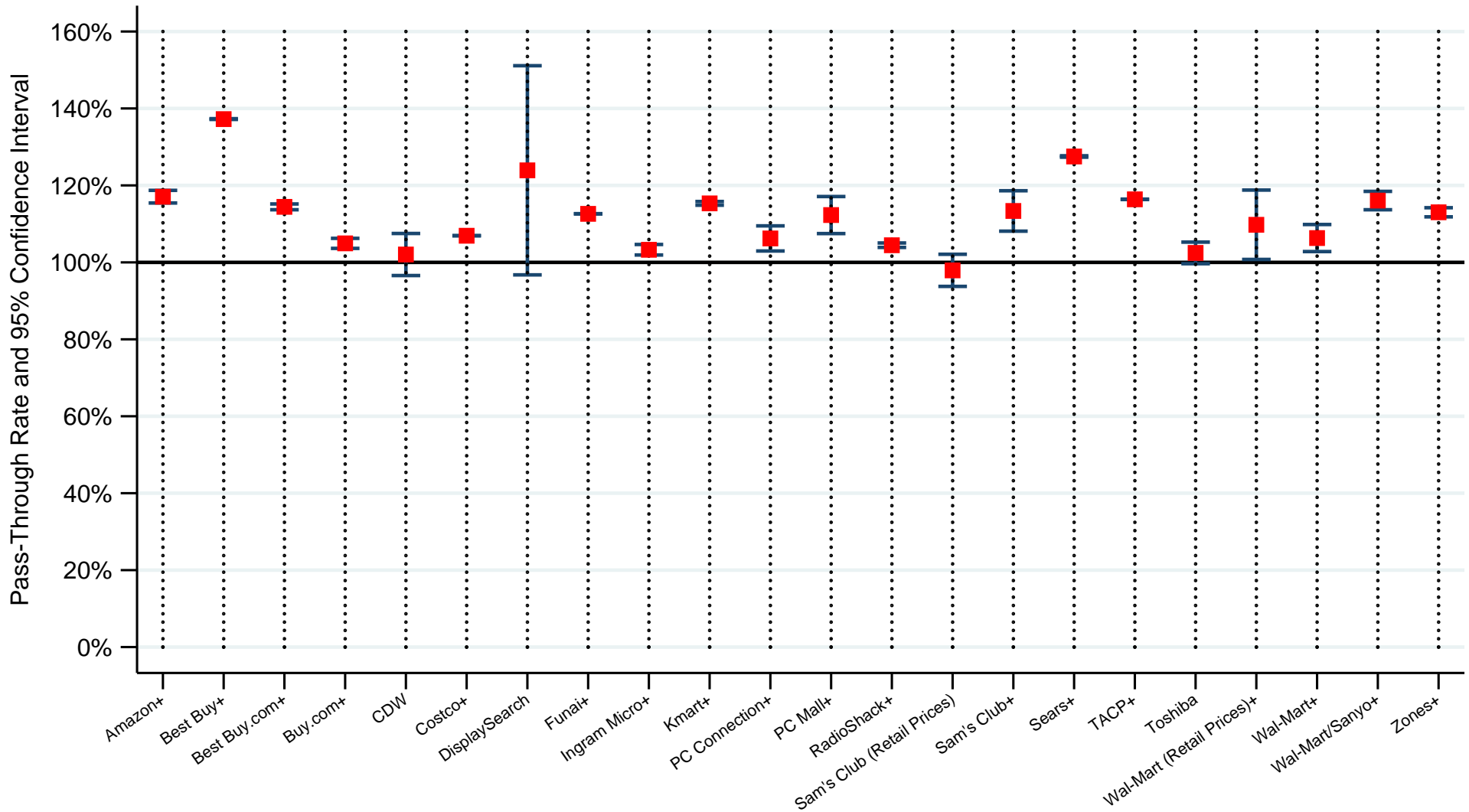


Econometric Study

Note: + The pass-through rate is statistically greater than 100%.
Source Files: See Exhibit RR-36.

Television Pass-Through

Calculated Pass-Through Rates and 95% Confidence Intervals

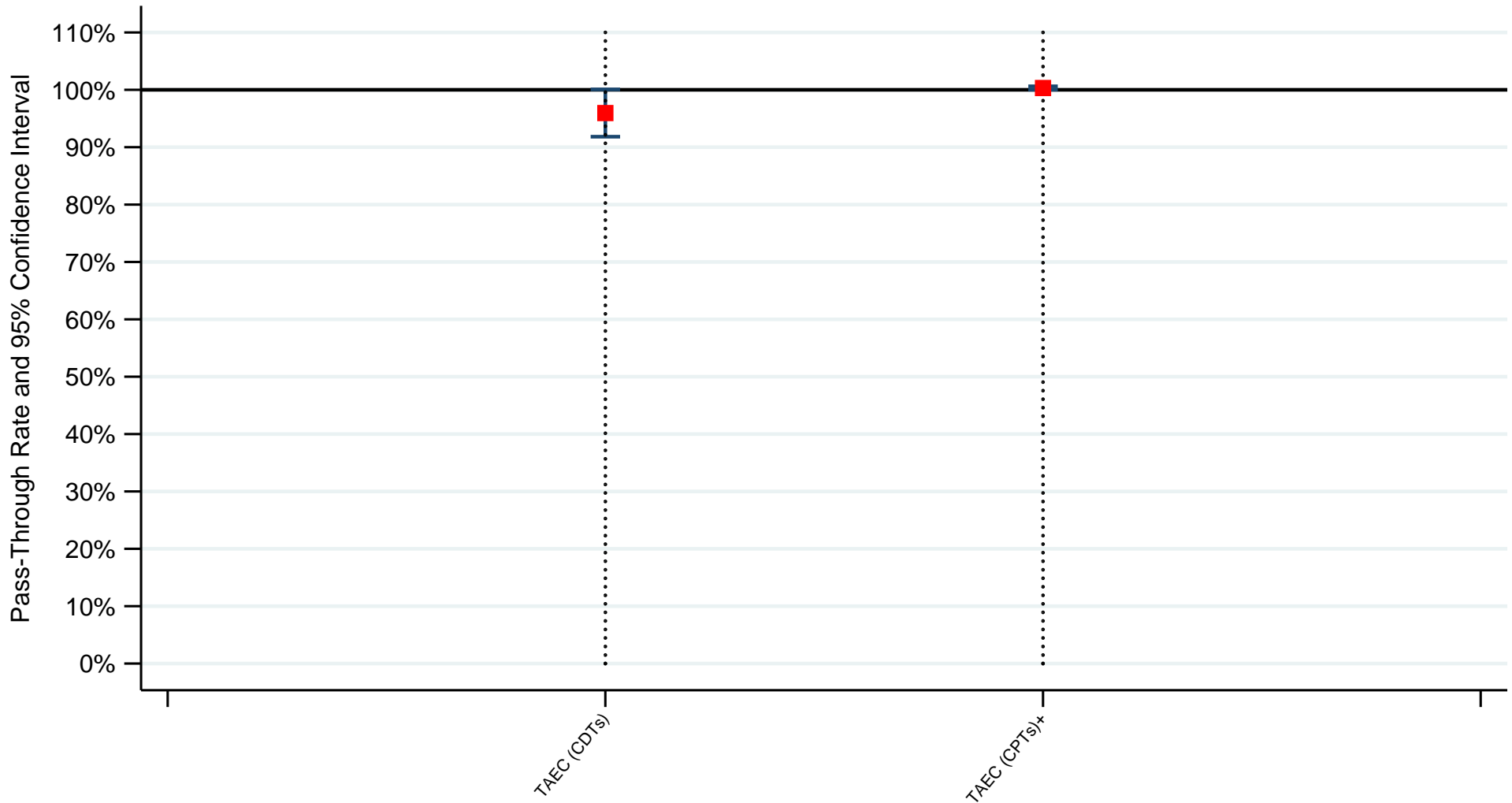


Econometric Study

Note: + The pass-through rate is statistically greater than 100%.
Source Files: See Exhibit RR-36.

Tubes Pass-Through

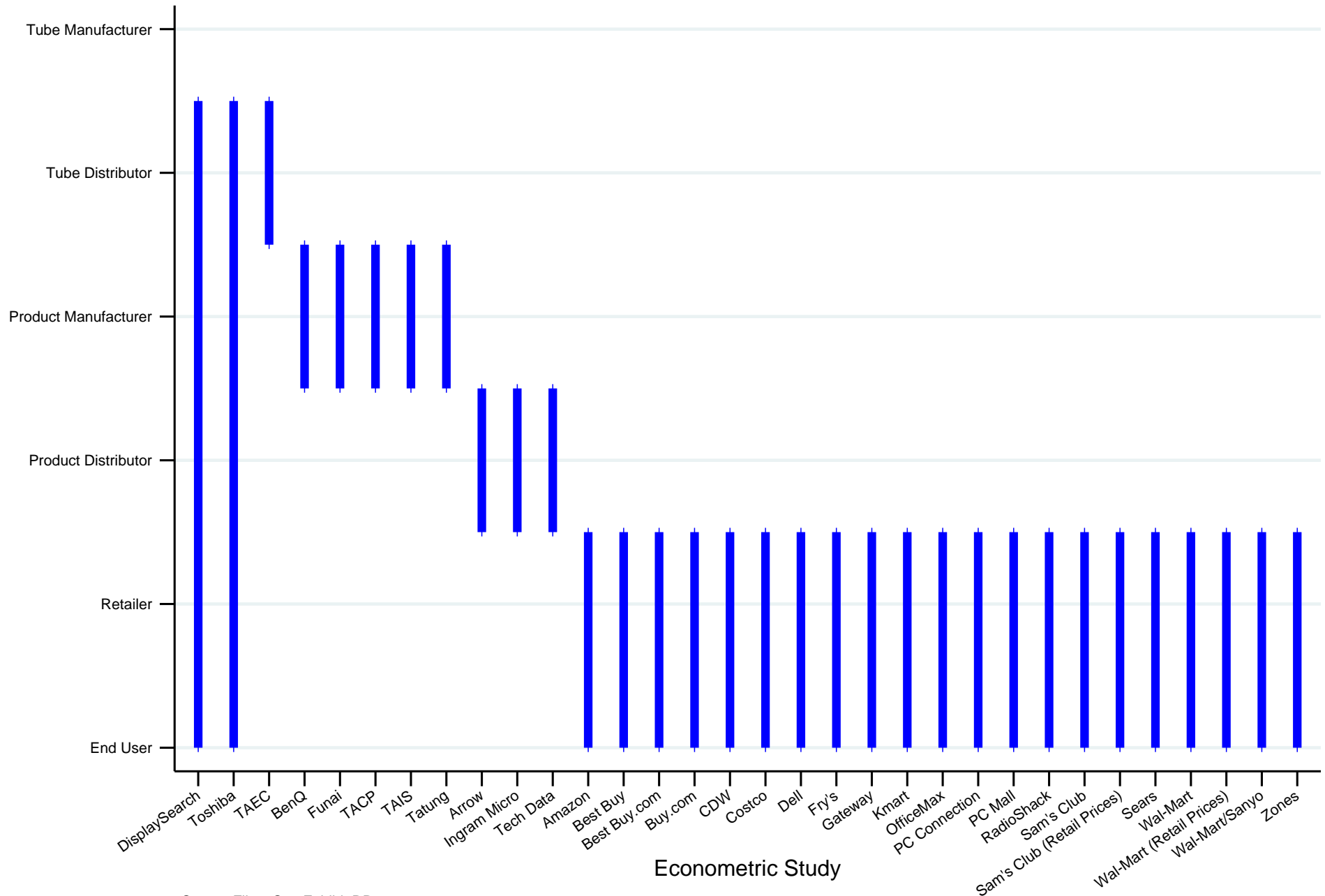
Calculated Pass-Through Rates and 95% Confidence Intervals



Econometric Study

Note: + The pass-through rate is statistically greater than 100%.
Source Files: See Exhibit RR-36.

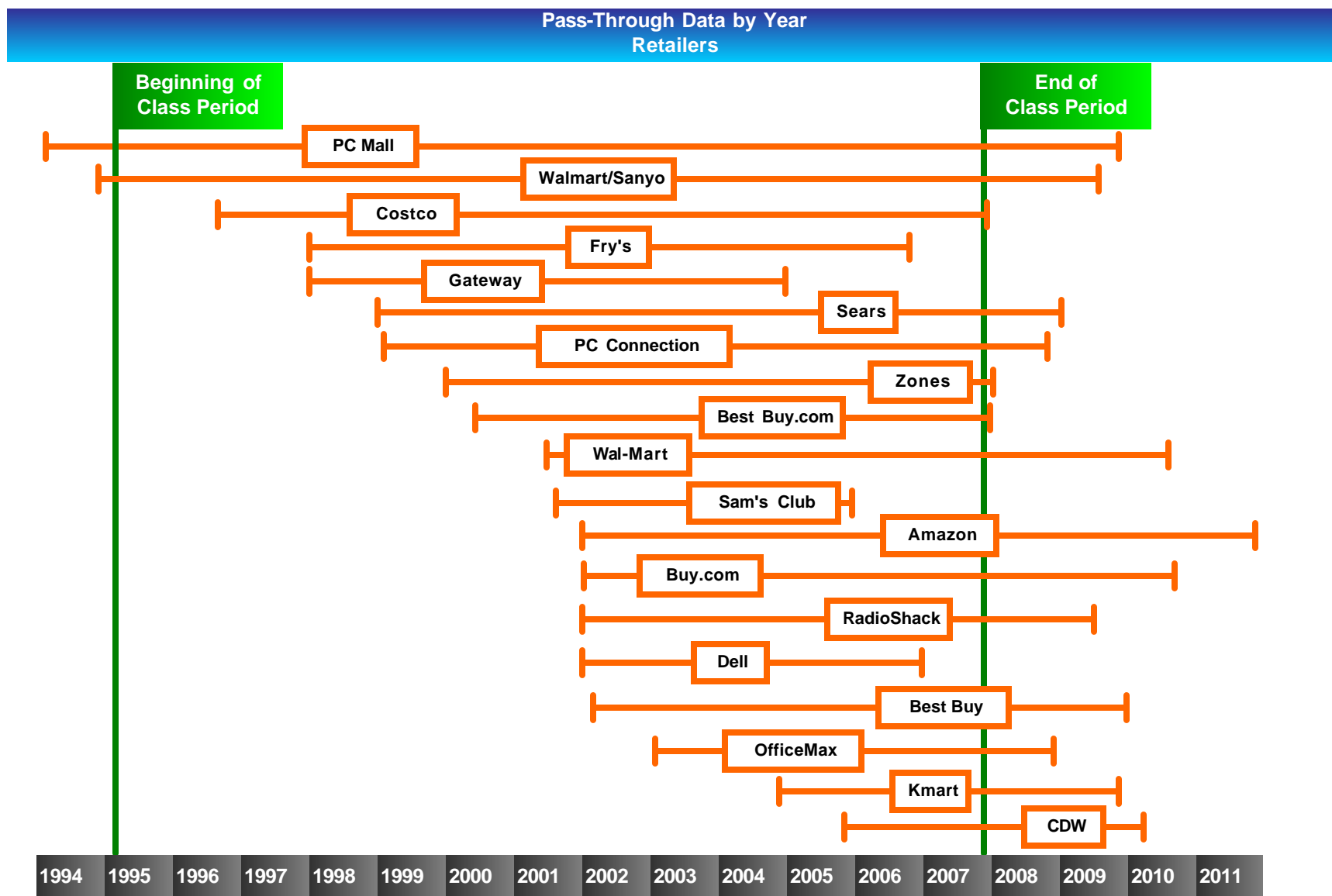
Pass-Through Studies Channel Coverage



Source Files: See Exhibit RR-36.

Econometric Study

Exhibit RR-40

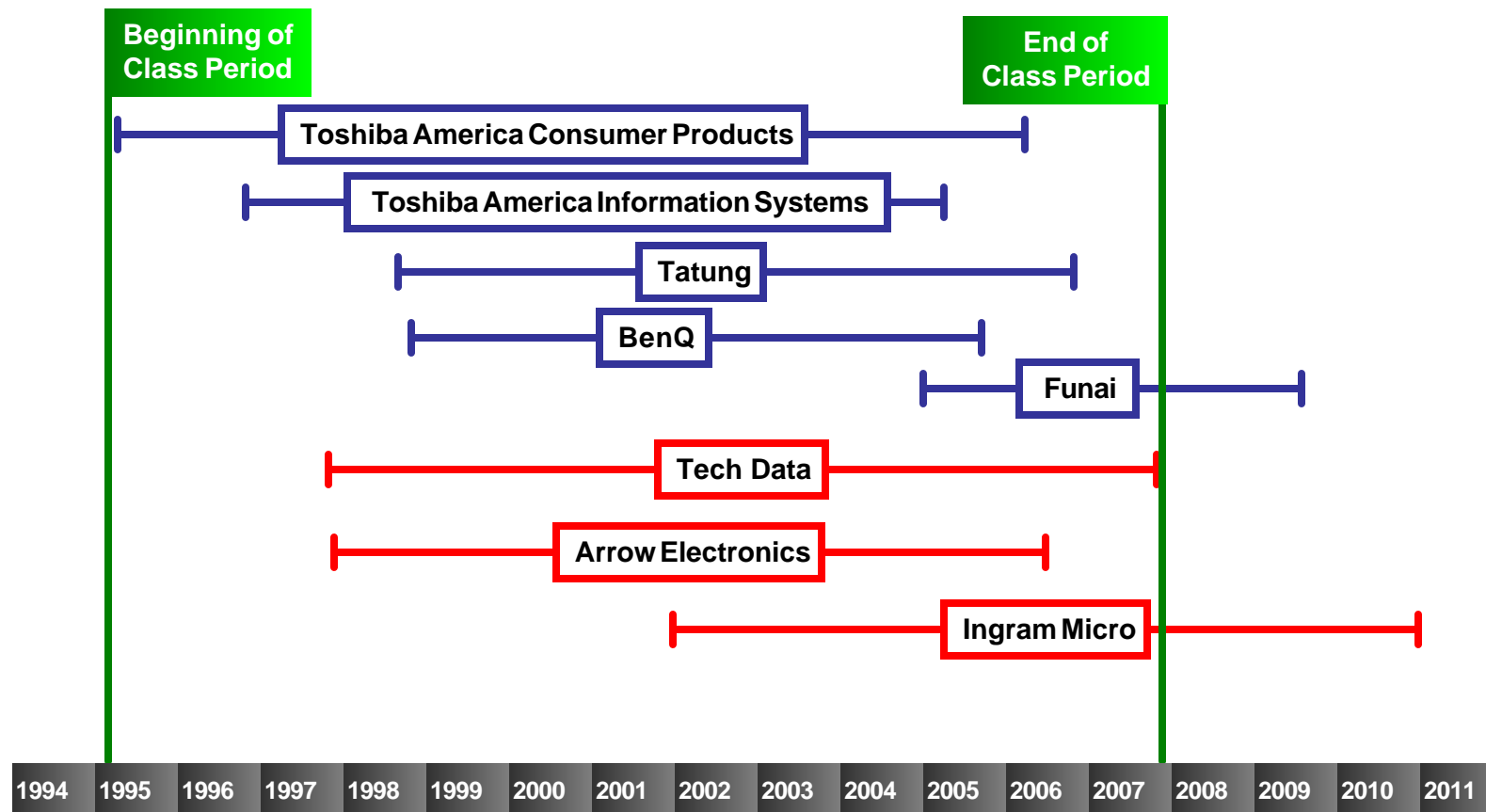


Source File(s):
See Exhibit RR-36.

Exhibit RR-41

Pass-Through Data by Year

Product Manufacturers and Product Distributors



Note(s):

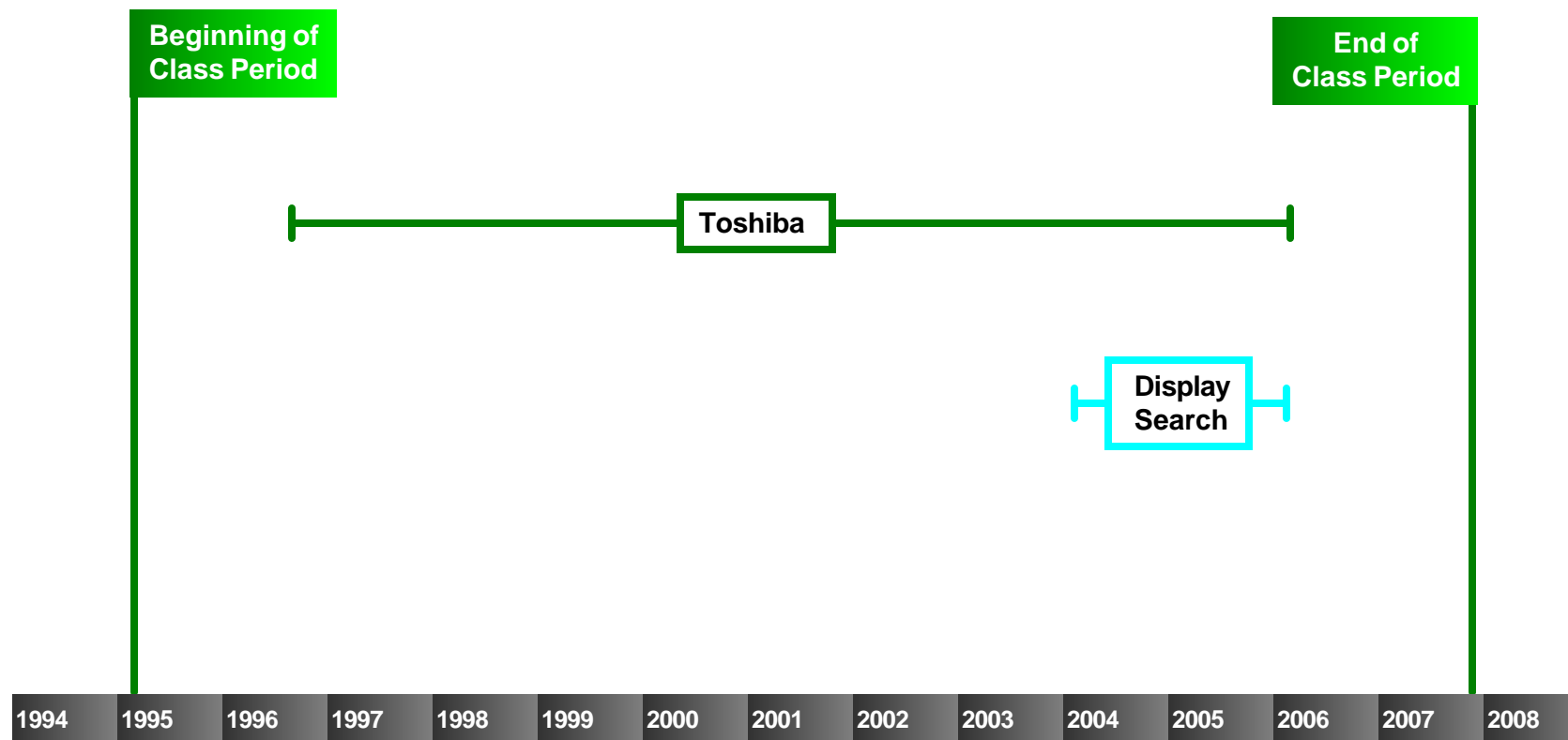
Blue indicates product manufacturers.
Red indicates product distributors.

Source File(s):

See Exhibit RR-36.

Exhibit RR-42

Pass-Through Data by Year Top-and-Bottom and Top-to-Bottom Studies



Note(s):

Blue indicates top-and-bottom studies.

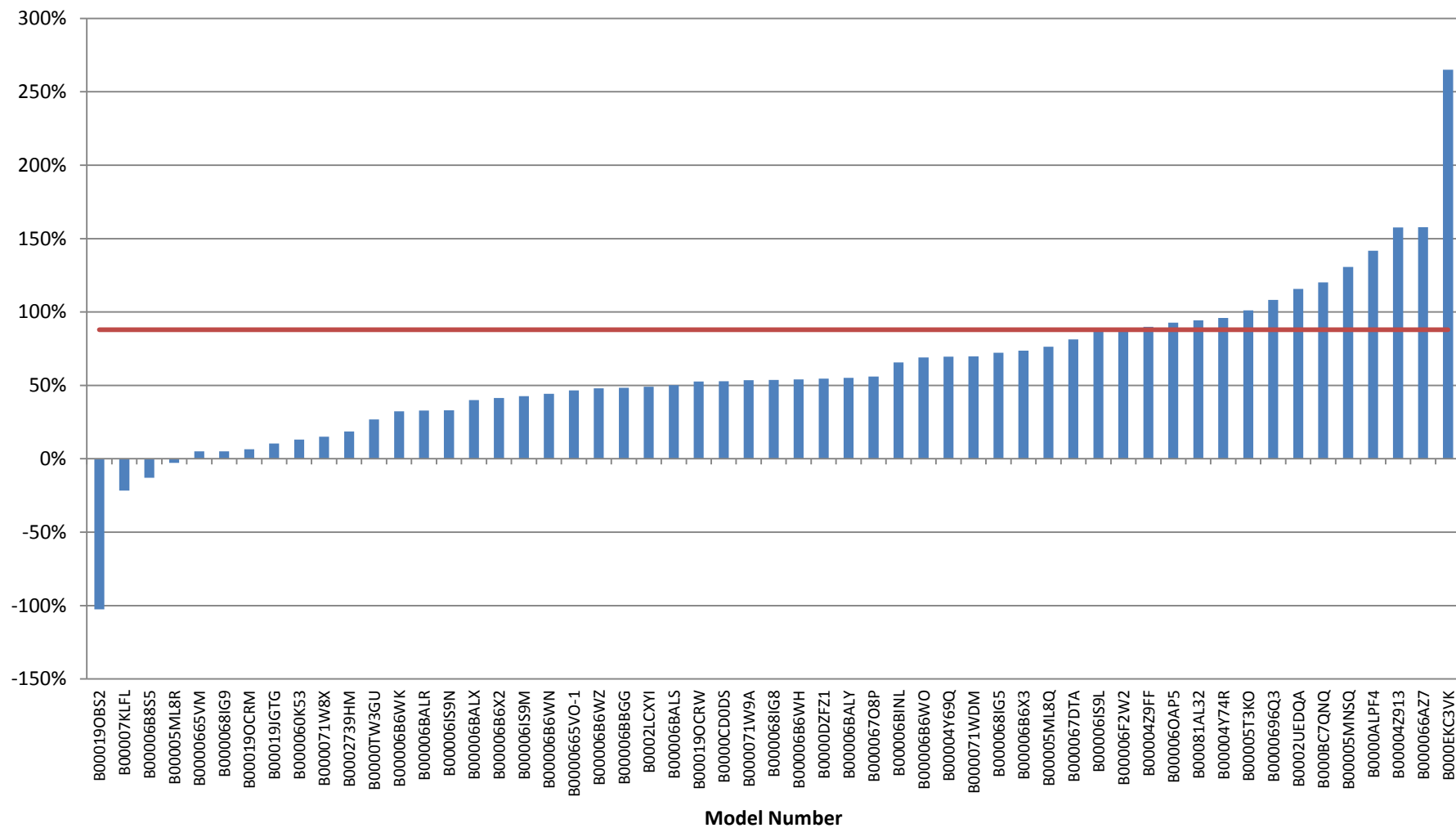
Green indicates top-to-bottom studies.

Source File(s):

See Exhibit RR-36.

Exhibit RR-43

Amazon Pass-Through Rates by CRT Monitor Model

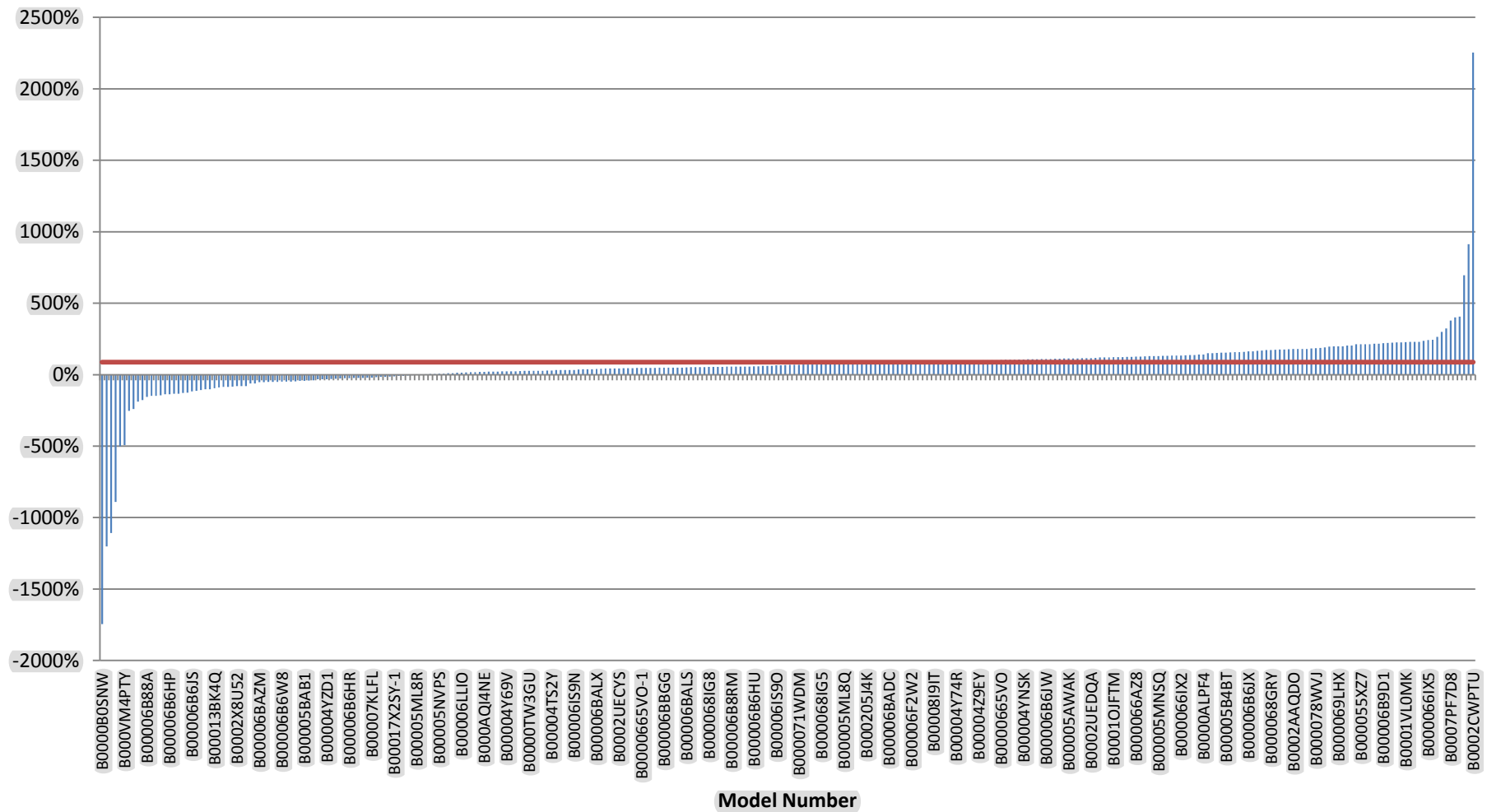


Note(s): This is a replication of Prof. Willig's Exhibit 27A, but it includes all monitors sold for at least 18 months, rather than the top 50 best-selling products only. The red line represents Prof. Willig's calculated average pass-through rate for Amazon monitors, 88%.

Source File(s): Exhibit 27 - Rebuttal.do, Exhibit27.xlsx

Data File(s): Amazon sales and procurement data.

Amazon Pass-Through Rates by CRT Monitor Model



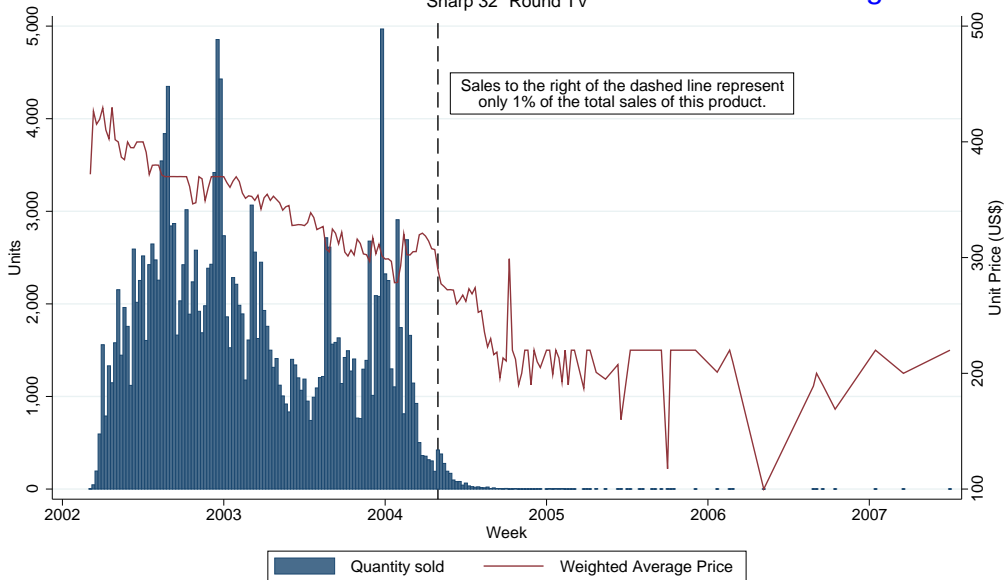
Note(s): This is a replication of Prof. Willig's Exhibit 27A, but it includes all monitors sold by Amazon. The red line represents Prof. Willig's calculated average pass-through rate for Amazon monitors, 88%.

Source File(s): Exhibit 27 - Rebuttal.do, Exhibit27.xlsx

Data File(s): Amazon sales and procurement data.

Best Buy CRT Product Unit Sales and Weighted Average Unit Price

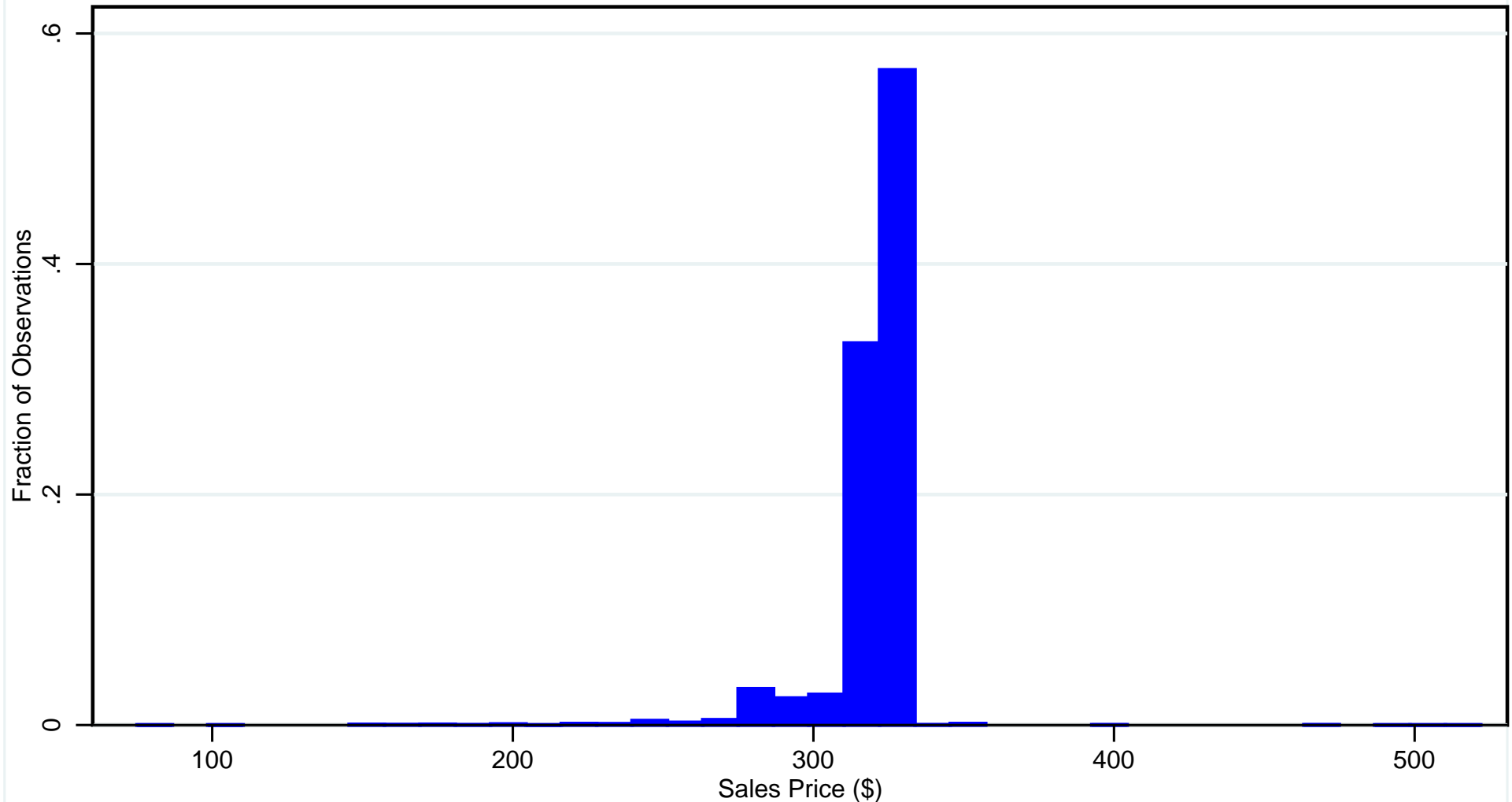
Sharp 32" Round TV



Note(s): Product is Best Buy reference number 4493426.
 99% of units were sold prior to April 29, 2004, indicated by the dashed line.
 Average prices are quantity-weighted, calculated weekly.
 Source File(s): See Exhibit RR-36; bestbuy_p&q_exhibit.do.
 Data File(s): Best Buy sales and procurement data.

Best Buy's May 2005 Prices for Product #7027415

27-Inch Toshiba Flat Screen CRT TV Purchased by Plaintiff Steve Ganz



Note(s): Steve Ganz purchased this 27-inch flat screen Toshiba CRT television for \$329.99.

The number of observations is weighted by the quantity sold and represents unit sales.

The vertical axis represents the percentage of units sold, i.e. 0.2 is 20%, 0.4 is 40%, and 0.6 is 60%.

The weighted average price for this product in May 2005 was \$319.91, ranging from \$74.99 to \$521.99.

Of the 7803 observations of this product, 4421 were sold for \$329.99 and 2466 were sold for \$312.99

Source File(s): Exhibit 36.do

Data File(s): See Exhibit RR-36.

EXHIBIT 37

**UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION**

IN RE: CATHODE RAY TUBE (CRT)
ANTITRUST LITIGATION

This Document Relates to:

ALL INDIRECT-PURCHASER ACTIONS

Master File No. CV-07-5944-SC
MDL No. 1917

**REBUTTAL DECLARATION OF
PROFESSOR ROBERT D. WILLIG IN
SUPPORT OF DEFENDANTS'
MOTION TO STRIKE THE
PROPOSED EXPERT TESTIMONY
OF DR. JANET S. NETZ**

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I. Assignment

1. I am a Professor of Economics and Public Affairs at the Woodrow Wilson School and the Economics Department of Princeton University, USA. I am also a Senior Consultant at Compass Lexecon, an economics consulting firm based in the U.S.

2. I have been retained by the Defendants¹ to address whether Plaintiffs are likely to be able to demonstrate through common proof on a class-wide basis, that all of the members of the proposed indirect purchaser class (“the IPP class”) suffered economic injury from the alleged conspiracy. I was also asked to review the expert report filed by Dr. Janet Netz, the economic expert for the IPP class, on October 1, 2012 (“Netz Initial Report”²) and opine on the analyses and views presented therein. Pursuant to this assignment, I filed an expert report on December 17, 2012 (“Willig Report” or “my report”).³

3. Since then, Dr. Netz has filed a declaration in support of Indirect Purchaser Plaintiffs’ response to the Defendants’ motion to strike her proposed testimony (“Netz Declaration”)⁴ and a rebuttal report (“Netz Rebuttal Report”).⁵ Counsel for Defendants have asked me to review and respond to the opinions and analyses contained in the new Netz Declaration and Netz Rebuttal Report with respect to all issues relevant to Defendants’ Motion to Strike the Proposed Expert Testimony of Dr. Janet S. Netz.

4. A list of matters in which I have given sworn testimony as an expert during the past four years, at trial or in deposition, is contained in Attachment 1. A list of the

¹ I have been retained by LG, SDI, Philips, Hitachi, Toshiba, Panasonic, and MTPD. I was also retained by SEA and SEC until March 12, 2013, the date the IPP class voluntarily dismissed those companies from their case.

² Declaration of Janet S. Netz, Ph.D. in Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, October 1, 2012.

³ Expert Report of Robert D. Willig, December 17, 2012.

⁴ Declaration of Janet S. Netz, Ph.D., in Support of Indirect-Purchaser Plaintiffs’ Opposition to Defendants’ Motion to Strike the Proposed Expert Testimony of Dr. Janet S. Netz, February 15, 2013.

⁵ Rebuttal Declaration of Janet S. Netz, Ph.D., in Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, February 15, 2013.

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information and data I relied upon in forming the opinions expressed herein is contained in Attachment 2. My opinions expressed herein are based on those materials and data, my knowledge and experience in industrial organization economics and antitrust economics, my experience in antitrust enforcement at the U.S. Department of Justice, and my experience in advising and consulting with clients on competition matters over the past 30 years, both here and abroad.

5. The opinions expressed in this declaration reflect the information and facts I believe to be true at the time this declaration is filed. I reserve the right to revise my opinions if additional information and facts supplied in discovery or through subsequent expert reports and depositions make such revisions appropriate.

6. Compass Lexecon is being compensated for my work at my usual hourly rate of \$1,350, which is the same rate for research and testimony. This compensation is in no way connected to the outcome of this litigation.

II. Summary of Opinions

7. Dr. Netz's conclusions are not "based on sound judgments that combine the facts and data of the case with widely accepted methods of economics," as she claims.⁶ Further, her opinions are not "consistent with generally-accepted economic theories and principles found in textbooks," nor are her "methods [for] evaluat[ing] the facts and data of the case consistent with the research implementing and testing these theories and principles on real world data published in peer-reviewed scholarly journals," as she herself admitted in her deposition.⁷ In this section, I briefly summarize the key points that demonstrate the lack of support for Dr. Netz's opinions. I provide a more detailed analysis in the body of this declaration.

⁶ Netz Declaration, p. 3.

⁷ Netz Declaration, p. 3. Specifically, Dr. Netz admitted during her deposition that she was unaware of her use of the term "price structure" being employed in a published peer-reviewed journal in the context of an unregulated industry. (Deposition of Dr. Janet Netz, March 15, 2013 ("Netz Deposition Vol. 2"), pp. 386-389.)

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8. Dr. Netz's opinion that classwide impact can be established using common methods and evidence rests on three claims: (a) Defendants' actual CRT prices were close to the alleged applicable target prices set by the alleged cartel; (b) a so-called "price structure" existed for CRTs; and (c) pass-through rates were uniformly positive across all CRT finished products sold by a given entity (*i.e.*, that there was universal pass-through by retailers and manufacturers). If any one of these three claims is incorrect, then her entire methodology for establishing common impact on indirect purchasers collapses. In fact, all three claims are fundamentally incorrect, thereby rendering her conclusions unreliable, as I discuss below.

9. Dr. Netz claims that the alleged target prices were always above the but-for (*i.e.*, competitive) level and that actual CRT prices were close to the alleged target prices. However, Dr. Netz offers no basis for her claim that the alleged target CRT prices were always above the competitive level, and in fact Dr. Netz contradicts this assumption herself in her Rebuttal Report. Specifically, she acknowledges that market conditions can change after a target price is set, potentially causing competitive prices to be above or below the alleged target price. It thus follows that even if the alleged cartel set a target price above what it expected to be the competitive level, unexpected changes in market conditions could propel the competitive price above the target price, likely resulting in no impact on direct purchasers and consequently no impact indirect purchasers.

10. Even accepting Dr. Netz's assumption that the alleged target CRT prices were always above the but-for CRT price, she nonetheless fails to demonstrate that any actual CRT price was higher than the corresponding target price, much less the corresponding but-for price. In particular, Dr. Netz is not able to explain how her comparison of actual and alleged target prices is reliable despite its bias towards mistakenly finding that actual prices are close to or above the alleged applicable target prices.⁸ Dr. Netz also does not contest my finding that, even ignoring the inherent bias in her comparison, the majority

⁸ Willig Report, ¶ 103-104. As I explain in my report, her analysis is biased because, as Dr. Netz acknowledges (Netz Initial Report, p. 63), she is often comparing a target price for more basic CRT models in a group of CRTs with the average actual price for that group.

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of CRT sales were priced below the alleged applicable target price. Since I filed my report, Dr. Netz has identified additional alleged target prices, and I still find that – even with the inherent bias in her comparison – more than half of Defendant’s CRT sales were priced below the alleged target price. Even assuming that all target prices were above the competitive level, it does not follow that an actual price that was below the alleged target price must have been above the but-for price. Dr. Netz has not estimated but-for prices, and she presents no methodology that reliably could be used to assess which, if any, of the actual prices that were below the alleged target prices were nevertheless above the corresponding but-for prices. Instead, she offers fragments of evidence that at most attempt to indicate that the alleged cartel was effective at elevating prices for *some* products or during *some* time periods, but this would not constitute proof of *classwide* impact. As a result, her assertion that all CRT prices were elevated above the competitive level amounts to an unsupported assumption rendering her entire actual and alleged target price analysis unreliable.

11. Dr. Netz’s opinion that a “price structure” existed for CRTs is essentially a claim that the relative prices of different types of CRTs would be about the same in the but-for world as in the actual world. Put differently, she is claiming that the cartel increased prices for all CRT products by about the same percentage. However, this claim is baseless. The central piece of evidence that Dr. Netz puts forth to support her claim that such a price structure exists is a set of hedonic regressions. However, those hedonic regressions only use actual and target price data from the claimed cartel period. As such, they are fundamentally incapable of telling us anything about the prices that would have existed but-for the putative cartel and, therefore, they fundamentally cannot provide any basis for Dr. Netz’s price structure claim.

12. The only other evidence offered by Dr. Netz is a set of documents that she claims demonstrates that the alleged cartel set differentials in the target CRT prices. Even if Dr. Netz were correct that the alleged cartel set target price differentials between different categories of CRTs, it would at most establish that the cartel hoped to achieve certain relative prices between pairs of CRT categories *in the actual world*. It would not provide any evidence whatsoever that the relative prices between CRT categories in the but-for world would have been the same as the allegedly targeted relative prices in the actual

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world – even if those target prices were uniformly adhered to by the alleged cartel members. As a result, Dr. Netz’s approach is fundamentally incapable of establishing the existence of a price structure of the kind that she defines and relies upon.

13. The above itself is sufficient to prove that Dr. Netz’s proposed methodology is unreliable because, without any basis, her conclusions become strictly assumptions. And, from an economic perspective, it is inappropriate to claim that a common approach is valid based on an unsupported assumption.

14. In fact, there is evidence indicating that Dr. Netz’s assumed price structure does not exist, evidence that Dr. Netz herself acknowledges. A “price structure” of the sort claimed by Dr. Netz cannot exist if prices in different segments of CRTs were affected by materially different market forces such that the ability and incentive of the alleged cartel to affect CRT prices differed across CRT segments. For example, if the alleged cartel substantially elevated the prices of some CRTs but failed to elevate prices of other CRTs (or elevated them less) because the latter had better substitutes and faced greater competition from alternative technologies, then relative prices in the actual and but-for worlds would be quite different – precisely the opposite of what Dr. Netz’s price structure would require. This is, in fact, exactly the situation surrounding the competition between CRTs and flat screens (LCD and plasma). As I explain in my report, LCD and plasma competition affected CDTs earlier and much more than CPTs, and it affected large CPTs earlier and much more than small and medium CPTs.⁹ As such, the alleged cartel’s ability to elevate prices was not uniform across those segments. Dr. Netz does not contest this possibility, nor does she contest the evidence in my report that competition from LCD and plasma technologies had differential impacts on various segments of CRTs. It thus follows as a matter of basic economic logic and common sense that Dr. Netz’s purported price structure could not exist.

15. Turning next to Dr. Netz’s claim that pass-through rates were uniformly positive across all CRT finished products, Dr. Netz’s methodology is unreliable because it

⁹ Willig Report, ¶¶ 56-63.

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calculates only the *average* pass-through rate for all TVs or monitors at each finished product manufacturer or reseller in the distribution chain – averaged across time periods, products, and transactions. Dr. Netz provides no empirical support for a claim that pass-through rates were uniformly positive across these myriad dimensions. Indeed, she provides no explanation of how her methodology could be used to assess pass-through rates for individual TV or monitor products or segments of TVs or monitors sold by a reseller or manufacturer, for different time periods, or any other disaggregated dimension. In fact, she makes no claim that her approach could be employed in any disaggregated manner, and instead she just proposes that her approach be used to estimate pass-through rates at highly aggregated levels (*e.g.*, all TVs sold by a retailer over all time periods). Given that Dr. Netz does not contest that various segments of the CRT and CRT finished product marketplace were subject to differentiated market forces, uniformly positive pass-through rates cannot be reliably assumed.

16. Having failed to provide any empirical evidence that pass-through rates were uniformly positive for all products, transactions and time periods, Dr. Netz relies entirely and mistakenly on economic theory to conclude that pass-through rates were uniformly positive. However, she greatly over-simplifies the relevant economic theory and assumes rather than establishes that the conditions necessary to apply the theory are satisfied in the CRT marketplace. In particular, Dr. Netz's claim that pass-through rates would be uniformly positive because the alleged cartel was able to achieve an across-the-board, significant, and permanent increase in CRT prices is inconsistent with record evidence showing that the alleged cartel was not uniformly or consistently effective (if at all) in elevating CRT prices. For example, competition from flat screen technologies likely constrained the ability of the putative cartel to elevate prices of some CRTs during certain periods. Moreover, as I have explained above and in my report, vertically integrated firms that manufactured CRTs and also finished products had the ability and incentive to deviate from alleged cartel prices, and I have provided evidence that the putative cartel was especially ineffective in elevating transfer prices of CRTs. Thus, the evidence indicates that not all CRTs' prices were elevated significantly and permanently by the actions of the alleged cartel as Dr. Netz claims. Indeed, since Dr. Netz has not estimated but-for prices, none of her analyses is capable of establishing that the putative cartel

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succeeded in elevating CRT prices significantly, and Dr. Netz acknowledged in her deposition that she has not established that all putative CRT price increases by the alleged cartel were significant.

17. Thus, in effect, Dr. Netz makes the unsupported assumption that pass-through rates were uniformly positive, *i.e.*, she assumes that there was universal pass-through by retailers and manufacturers.

18. As is also the case with the other two claims on which Dr. Netz's opinion is based, the evidence indicates that her fundamental assumption of uniformly positive pass-through is incorrect. As I show in my report, the evidence indicates that pass-through rates were heterogeneous across multiple dimensions and that many of them were not positive – indicating the absence of pass-through due to market conditions.¹⁰ (Dr. Netz's criticism of the pass-through analyses I used to demonstrate the unreliability of her aggregated pass-through estimates is unfounded, as I discuss below.)

19. In sum, Dr. Netz has failed to provide any valid support in her declaration for any of the three claims that underlie her proposed generalized approach for establishing classwide impact, which renders her approach essentially a series of inappropriately applied methodologies and unsupported assumptions leading to unreliable conclusions. From an economic perspective, that itself is a fatal flaw. But, compounding the failure, the evidence indicates that Dr. Netz's assumptions are not just unsupported – they are simply wrong.

20. The remainder of this declaration provides further details on the above findings and conclusions.

¹⁰ See, *e.g.*, Willig Report, ¶¶ 123-125, 134-137.

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III. The Methodologies Used by Dr. Netz to Establish Common Impact on Direct Purchasers Are Unreliable and Based on Unsupported Assumptions.

21. Dr. Netz claims that common methods and evidence can be used to reliably establish that the alleged CRT price-fixing conspiracy impacted all members of the proposed IPP class. With regard to alleged overcharges paid by direct purchasers, Dr. Netz's underlying assertion rests on two claims:

- a) The first claim is Dr. Netz's contention that the Defendants actually did set CRT sales prices that matched "target prices" established by the alleged cartel.
- b) The second is Dr. Netz's claim that prices of CRTs exhibited a "price structure" that in her view implies that relative prices would have been the same in the actual and but-for world, which is equivalent to saying that the alleged cartel was successful in elevating prices of all CRTs by about the same percentage amount.

A. Dr. Netz's Assumptions and Methodologies Used to Claim Uniform, Effective, and Sustained Collusion

22. Dr. Netz contends that her analysis comparing target CRT prices identified by her with actual CRT prices shows that the alleged cartel was effective in elevating CRT prices. For example, in her declaration, she states that "[w]hat I do conclude from the target price analysis is the effectiveness of the cartel in fixing prices."¹¹ However, in my report, I explain why Dr. Netz's target vs. actual price comparisons do not support her opinion that the putative cartel was consistently effective in elevating CRT prices, and that, in fact, her own data contradict her. In her declaration, Dr. Netz does not contest my analysis that her approach is fundamentally biased. I expand on this topic and related issues in this section.

¹¹ Netz Declaration, p. 11. In her rebuttal report, Dr. Netz claims that "[t]he record evidence that actual prices closely matched target prices supports the conclusion that the cartel was effective." (Netz Rebuttal Report, p. 71)

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Dr. Netz Does Not Contest That Her Comparison of Actual and Target Prices is Fundamentally Biased. This Bias and Other Flaws Make Dr. Netz's Target Price Methodology Unreliable.

23. I explain in my report that Dr. Netz's comparisons of actual and target price levels at a given point in time are fundamentally flawed. Dr. Netz does not contest or address most of my criticisms of her comparison between actual and target price levels. In particular, Dr. Netz does not contest my opinion that her comparison of actual and target prices "is biased in the sense that her test would tend mistakenly to indicate that actual sales prices were at or above target prices regardless of whether manufacturers set their actual prices below target prices."¹² This bias almost surely causes her to overstate the share of the Defendants' CRT sales for which actual prices were above the alleged target price and to understate the magnitude by which actual CRT prices were below the alleged target prices.

24. Dr. Netz also does not contest my point that she presents actual-to-target price comparisons that are either averaged across all CRT products sold in a given month or aggregated across the entire class period, and that as a result, her analysis masks considerable differences between the actual and target prices for individual CRT models as well as variations over time.¹³ Dr. Netz's new comparisons between actual and target prices are presented in an identical fashion and therefore suffer from the same flaw.¹⁴

25. Lastly, Dr. Netz does not contest my finding that comparisons between the actual price for a given CRT (defined in terms of a model, customer, and month) and the putative target price that Dr. Netz alleges is applicable to that CRT reveal that the majority of CRT sales were priced below the alleged applicable target price.¹⁵ Dr. Netz

¹² Willig Report, ¶ 103. As explained in my report, her analysis is biased because, as Dr. Netz acknowledges (Netz Initial Report, p. 63), she is often comparing a target price for more basic CRT models in a product group with the average actual price for that product group (Willig Report, ¶ 104).

¹³ Willig Report, ¶ 106 (referencing Netz Initial Report, Exhibits 14-17).

¹⁴ Netz Rebuttal Report, Exhibits RR-15, 26, and 27.

¹⁵ Willig Report, ¶¶ 107-108 and Exhibit 18.

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has since identified additional alleged target prices in her rebuttal report. I have updated my comparisons of actual and target prices using her updated alleged target price data and find that the share of actual prices that are below the allegedly applicable target prices is now even higher.¹⁶ Specifically, I find:

- a) Across all months, 64% of the CRT sales volume for which Dr. Netz identified an alleged target price was priced below that target price.
- b) In 86% of the months in Dr. Netz's analysis, a majority of CRT sales volume for which Dr. Netz identified alleged target prices was priced below the alleged applicable target price.
- c) In more than 98% of the months in which Dr. Netz identified alleged target prices, at least 25% of actual prices (quantity weighed) were below the alleged applicable target price.

26. The aforementioned flaws in Dr. Netz's methodology, which Dr. Netz does not contest, are by themselves sufficient to render Dr. Netz's target price analysis unreliable for the purposes of establishing her conclusion regarding "the effectiveness of the cartel in fixing prices."¹⁷ Nevertheless, below I address Dr. Netz's responses to the finding of additional flaws in her target price analysis.

Dr. Netz's Target Price Dataset Has Significant Shortcomings.

27. As a robustness check on my comparison of actual and target prices, I considered whether the substantiality of the share of actual prices that fell below the allegedly applicable target price could result from Dr. Netz being unable to identify precisely the target price applicable to a given model in a particular month. Although Dr. Netz does not contest my finding that the majority of CRT sales were priced below the allegedly applicable target prices, she does criticize this one robustness check. As explained below, Dr. Netz's criticism is misplaced since the issues she raises stem from limitations in target price data she compiled and her averaging of those data.

¹⁶ For example, whereas Dr. Netz previously found that 37% of CRT sales were priced at least 5% below the alleged applicable target price (Netz Initial Report, p. 63), she now finds that 42% of CRT sales were priced at least 5% below the alleged applicable target price (Netz Rebuttal Report, pp. 33).

¹⁷ Netz Declaration, p. 11.

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28. Dr. Netz often identifies more than one alleged target price that might have applied to a given CRT sale. Because she does not know which alleged target price (if any) actually applied to the given sale, Dr. Netz averages the potentially applicable target prices together and compares the average to the actual price. Thus, as a robustness check on my (uncontested) finding that the majority of actual CRT prices were below the average of the alleged applicable target prices identified by Dr. Netz, I considered whether actual CRT prices were at least close to *any* of the potentially applicable target prices. As I describe in my report, 30% of CRT sales volume was priced more than 5% below the lowest potentially applicable target price, and another 23% was priced more than 5% above the highest potentially applicable target price during the relevant period.¹⁸ ^{19, 20} For reasons I explain in my report, even the 48% of transactions that were priced within 5% of the range of potentially applicable target prices identified by Dr. Netz do not necessarily represent adherence by Defendants to the putative target prices.²¹

29. Dr. Netz criticizes my analysis because for 60% of the sales volume considered in my analysis, the range of potentially applicable alleged target prices consisted of a single alleged target price. Dr. Netz proceeds to highlight some examples in which the range

¹⁸ Willig Report, ¶ 110 and Exhibit 19. I have updated my analysis to include any additional alleged target prices that Dr. Netz has identified since I filed my report. I now find that 33% of CRT sales volume was priced more than 5% below the lowest potentially applicable target price, and another 18% was priced more than 5% above the highest potentially applicable target price during the relevant period.

¹⁹ This analysis is conservative because, as Dr. Netz acknowledges, “target prices are generally for basic models” (Netz Initial Report, p. 63), whereas actual prices include prices for premium CRTs, which likely causes my analysis to understate the share of CRT sales volume priced below the minimum potentially applicable target price.

²⁰ One potential explanation for actual prices that were well above the highest potentially applicable alleged target price is that, as discussed later, unexpected changes in market conditions following the alleged setting of a target price could have resulted in the competitive price being higher than the alleged target price. If that occurred, the Defendants would have had an economic incentive to adjust their prices upward, at least to the competitive level. However, if Defendants did not increase their prices beyond the competitive level, the alleged cartel would have had no impact on CRT customers for those sales.

²¹ Willig Report, ¶¶ 111-113. For example, suppose Dr. Netz identifies potentially applicable target prices of \$50 and \$60 for a particular CRT that was sold by one of the Defendants for \$55. The actual price would fall inside the range of potentially applicable target prices, but it could be that the \$60 target price is the one that actually applies to that sale and the \$50 target price applies to a more basic model, in which case the Defendant would have actually undercut the target price by \$5.

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consisted of a single alleged target price and asserts that the cartel likely agreed upon other potentially applicable target prices, which, if observed, would have resulted in a larger range of potentially applicable target prices to which actual prices could have been compared.²² However, Dr. Netz appears to have misunderstood the objective of my analysis. It was not my intention to speculate about the possible existence of unobserved target prices that could reconcile the frequent disparities between actual prices and the target prices identified by Dr. Netz with Dr. Netz's unsupported allegation that "prices paid by [CRT customers] were approximately equal to the cartel's target prices."²³ Rather, my objective was to assess whether it is plausible that Defendants uniformly adhered to the alleged target prices that Dr. Netz actually identified. Put differently, my analysis shows that Dr. Netz has provided no evidence that the substantial share of actual prices that were significantly below the lowest potentially applicable alleged target price were consistent with adherence to the alleged agreement to price at supracompetitive levels. Dr. Netz's criticism of my analysis therefore amounts to a claim that the cartel may have adhered to such an agreement even though it cannot be reliably demonstrated using the data she has collected.

30. I also wish to address the examples that Dr. Netz presents in her rebuttal report of potentially applicable alleged target price ranges that are comprised of a single alleged target price. Specifically, Dr. Netz points to several instances in which she has identified alleged target prices only for flat 21-inch ITC CPTs. She asserts that the alleged cartel likely also agreed to target prices for curved 21-inch ITC CPTs,²⁴ with the unstated implication being that the observed 21-inch ITC CPT prices that are more than 5% below the alleged target prices for flat 21-inch ITC CPTs *might* represent curved CPTs that *might* have been priced at or near the (unobserved) target price for *curved* 21-inch ITC CPTs. However, there is no evidence that a target price existed for curved 21-inch ITC CPTs during that period, that the actual prices more than 5% below the alleged target

²² Netz Rebuttal Report, pp. 34-35.

²³ Netz Initial Report, p. 33.

²⁴ Netz Rebuttal Report, pp. 35.

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price for flat 21-inch ITC CPTs were for curved 21-inch ITC CPTs, or that these actual prices were above the target price for curved 21-inch ITC CPTs, if such a target price even existed.

31. Nevertheless, I have extended my original analysis to address these examples. Specifically, I focus on the version of Dr. Netz's target price analysis that matches actual to target prices based on the manufacturer, application (CDT or CPT), finish (bare or ITC), size, and shape (curved or flat).²⁵ In this version of her analysis, she matches actual flat CRT prices with alleged flat CRT target prices and actual curved CRT prices with alleged curved CRT target prices. Thus, in this version of the analysis, if an actual price for a curved 21-inch ITC CPT is more than 5% below the lowest potentially applicable alleged target price, it cannot be because the alleged target price is for flat 21-inch CPTs; only alleged target prices for curved 21-inch ITC CPTs would qualify as potentially applicable. Even when taking CRT shape into account in this fashion, I find that 27% of CRT sales volume was priced more than 5% below the lowest potentially applicable target price, and another 29% was priced more than 5% above the highest potentially applicable target price during the relevant period.²⁶

32. As noted above, this extension is based on actual and target prices that Dr. Netz matched based on manufacturer, application, finish, size, and shape. This list includes all of the attributes that Dr. Netz describes as major price differentiators.²⁷ If Dr. Netz's assertion is correct, then the substantial share of CRT prices that are more than 5% below or above the range of potentially applicable alleged target prices cannot be explained by *unobserved* target prices that differ from the allegedly *observed* target prices only due to

²⁵ In order to include shape as one of the characteristics on which she matches actual and target prices, Dr. Netz limits this analysis to the CRT sales data for Panasonic, MTPD, and SDI, which are the three Defendants whose CRT sales data in some cases identify the shape of the CRT model. (Netz Initial Report, p. 64)

²⁶ These figures include any additional alleged target prices that Dr. Netz has identified since I filed my report.

²⁷ Netz Rebuttal Report, pp. 12-13.

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other attributes, which Dr. Netz describes as “minor price differentiators.”²⁸ That is, the likely explanation for actual CRT prices being more than 5% below the lowest potentially applicable alleged target price is non-adherence to *any* alleged target price (observed or unobserved). Conversely, if Dr. Netz’s assertion that product attributes other than finish, size, and shape are minor price differentiators is invalid, it would leave open the possibility that actual CRT prices more than 5% below the lowest potentially applicable alleged target price might represent adherence to an unobserved target price, but it would not be possible to prove it using the data on which Dr. Netz relies.

Dr. Netz’s Own Target Price Data Show Little or No Connection between Changes in Target CRT Prices and Changes in Actual CRT Prices.

33. In my report, I present an econometric analysis showing that changes in target CRT prices identified by Dr. Netz do an extremely poor job of predicting actual CRT price changes.²⁹ As I explain in my report, this is a strong indication that the Defendants did not closely or consistently adhere to the target prices identified by Dr. Netz.³⁰

34. In her rebuttal report, Dr. Netz criticizes my analysis in three ways. First, she claims that changing market conditions can result in actual price changes that differ from target price changes even for an effective cartel. Second, she claims that I did not account for the impact of exchange rate movements on actual prices expressed in U.S. dollars. Lastly, she claims I did not account for the impact of changes in the mix of

²⁸ *Id.* As explained in paragraph 105, price differences of at least 5% are significant in the context of CRT pricing.

²⁹ Willig Report, ¶¶ 92-101. Dr. Netz has since identified additional alleged target prices. I have incorporated these alleged target prices into my analysis, re-estimated the regressions presented in my report and find that the results are qualitatively similar to those presented in my report. Specifically, I find that, using the new data, the R-squared statistic in my baseline regression model is 0.056, which implies that only 5.6% of the variation in actual price changes is explained by target price changes. Similarly, the estimated coefficient on the change in target price is 0.162, which implies that a 5 percentage point increase in the target price identified by Dr. Netz is, on average, associated with only a 0.81 percentage point increase in the actual price during the same time period. (See row 1 of Exhibit 16A-R.) I have conducted several robustness checks on this regression and none of the variations yield an R-squared above 0.079. (*Id.*)

³⁰ Willig Report, ¶¶ 92-101.

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identified target prices when calculating target price changes. For reasons I explain below, Dr. Netz's criticisms are without merit and, in fact, her arguments further undermine her own methodologies for establishing that the alleged cartel was highly effective in elevating CRT prices.

Dr. Netz's Explanation for Why Target Price Changes Need Not Predict Actual Price Changes Undermines Her Methodologies Used to Attempt to Establish that the Alleged Cartel Had Classwide Impact.

35. Dr. Netz offers the following explanation for why actual price changes might differ from target price changes:

“When the target price becomes effective, the observed actual price may be higher than it was the previous month, but it may also be lower, even if all cartel members attempt to enforce the target, if the effect of all other influences on price are [sic] negative and larger in magnitude than the increase in the target price.”³¹

Thus, Dr. Netz acknowledges that “all other influences on price” (*i.e.*, market forces) could cause the competitive price to end up being higher than the target price. This implies that classwide impact is unlikely and in any case cannot be established through common proof. For example, suppose that in March of some year the alleged cartel agreed upon a target price of \$100 for a particular CRT in the second quarter of that year. Suppose further that after the target price was set in March, the other influences that Dr. Netz cites, such as changes in “consumers’ incomes, changes in consumers’ tastes, growth in computer usage, inventory, and manufacturing costs,”³² cause the but-for (*i.e.*, competitive) price for the given CRT to rise from \$95 to \$105 in the second quarter. The above quote makes clear that Dr. Netz agrees that such a scenario is plausible. In that scenario, because the hypothesized target price was only \$100, below the competitive price, there is no reason to assume that the actual prices would be affected by the target price, which implies that there would be no impact on the prices paid by CRT customers

³¹ Netz Rebuttal Report, p. 36.

³² Netz Rebuttal Report, p. 36.

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(and thus no impact on the downstream indirect-purchaser Plaintiffs). Moreover, unless the alleged cartel was always overly-optimistic about future market conditions, it is highly likely that the scenario hypothesized above would have come to pass during multiple stretches of the alleged class period.³³

36. Additionally, if market conditions were substantially variable and unpredictable and target prices were not adjusted frequently enough to respond to such changes – as Dr. Netz implies in the above quote – it would have been difficult for the alleged cartel members to effectively detect and punish cheating on the alleged agreement. For example, it would be difficult for cartel members to know when it would be viewed as acceptable to deviate from the target price as a result of changing market conditions and when such conduct would or should be punished.

37. Thus, the fact that unexpected changes in market conditions could override the alleged cartel's efforts to enforce target prices, which Dr. Netz acknowledges, undermines Dr. Netz's opinion that the cartel elevated prices on all CRTs during the class period.

38. Dr. Netz mistakenly claims that I should have controlled for these changes in market conditions in my econometric analysis of changes in actual prices and alleged target prices. Specifically, she states:

“Prof. Willig’s ‘test of cartel effectiveness’ is invalid because he chose a model that attributes, in error, all changes in sales prices to the effect of the cartel alone. He made this choice despite his awareness that market conditions, too, affect CRT prices, and that CRT prices generally trended downward during the relevant period. He was not forced to make this choice by any dearth of alternatives: standard methods exist for estimating the independent effect of multiple variables, such as the independent effect of target prices, after controlling for the effect of market forces on sales prices.”³⁴

³³ Although this scenario contemplated the impact of unexpected changes in market conditions for a specific CRT, the same logic applies to unexpected changes in market conditions that could have caused the but-for price to be higher than the target price for some CRT segments and not others, or in some regions and not others.

³⁴ Netz Rebuttal Report, p. 37.

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Dr. Netz's criticism is without merit and flies in the face of basic economics. As an initial matter, Dr. Netz is just mistaken when she says that my model "attributes ... all changes in sales prices to the effect of the cartel alone." On the contrary, my model just measures the extent to which changes in actual CRT prices can be predicted by changes in the allegedly applicable target prices, and finds that changes in the alleged target prices do not predict changes in actual CRT prices well at all.³⁵

39. Moreover, as I explained in my report, the fact that I did not "[control] for the effect of market forces on sales prices," causes my model to be a conservative test of cartel effectiveness because the model attributes any co-movement between actual and alleged target prices to adherence by the alleged cartel when the co-movement may instead have been caused by changes in market forces that had a common impact on actual and target prices.³⁶ Put differently, because market forces are likely to have the same directional effect on actual and target prices – *e.g.*, a decline in demand for CRTs is likely to result in lower actual and target prices – controlling for changes in market conditions is likely to lower the estimated ability of alleged target price changes to predict actual price changes.

40. Nevertheless, to further confirm the conservatism of my original model, I re-estimate my regression with "[controls] for the effect of market forces on sales prices" and then isolate the "independent effect of target prices" (as Dr. Netz suggests). Specifically, I include in my regression a series of macroeconomic variables that were likely correlated with changes in supply and demand conditions for CRTs,³⁷ and then

³⁵ Willig Report, ¶¶ 92-93.

³⁶ Willig Report, ¶ 93 ("Moreover, even this slight correlation does not imply causation (*i.e.*, the change in actual price may not be due to the change in target price) since actual and target price changes are both likely to have been affected in the same direction by common market factors, generating some positive correlation between the two series, irrespective of whether Defendants ever adhered to the alleged target prices.")

³⁷ Specifically, I included monthly changes in the following macroeconomic variables on the right hand side of the regression equation: (a) the unemployment rate and total industrial production for the G7 countries (the United States, the United Kingdom, Germany, France, Italy, Japan, and Canada); (b) exchange rates between the U.S. Dollar and the Japanese Yen, Korean Won, Taiwanese New Dollar, and Brazilian Real; and (c) microprocessor, energy, and crude petroleum price indices.

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estimate the extent to which changes in actual CRT prices can be predicted by changes in the alleged applicable target prices after controlling for these market forces. Consistent with the economic logic described above, the resulting estimated coefficient on the target price change and the portion of the R-squared attributable to the change in the alleged target price are even lower in the regression that includes macroeconomic controls than in the regression that does not.^{38, 39}

41. Thus, consistent with economic theory, the empirical evidence shows that controlling for changes in CRT market conditions leads to the conclusion that changes in the alleged target prices predict changes in actual CRT prices even more poorly than when these market conditions are ignored.

My Target Price Compliance Analysis Was Based on a Proper Measure of Actual Price Changes.

42. The results of my regression analysis comparing actual and target price changes to assess whether the alleged cartel was uniformly effective (if at all) in elevating prices supports the conclusion that Dr. Netz's methodologies for assessing the cartel's effectiveness are unreliable. Dr. Netz mistakenly criticizes my reliance on changes in actual U.S. dollar prices in my regressions. Specifically, she states,

³⁸ Specifically, the estimated coefficient on the change in the alleged target price is 0.141 in the model that includes macroeconomic control variables and 0.162 in the model that does not. (See Exhibit 16A-R, rows 4 and 1, respectively.) The portion of the R-squared associated with the change in the alleged target price is 0.048 in the model that includes macroeconomic control variables and 0.056 in the model that does not. (*Id.*) (I use the same method for decomposing the R-squared that Dr. Netz employs in her hedonic price analyses presented in Exhibits 21-24 of her initial report.) I have conducted several robustness checks on this regression and in each case the estimated coefficient on the change in the alleged target price and the portion of the R-squared attributable to the change in the alleged target price are lower in the regression that includes macroeconomic control variables than in the regression that does not. (See Exhibit 16A-R, row 4).

³⁹ The macro variables I include in my regression are relevant for predicting actual price changes as evidenced by the fact that the overall R-squared in the model that includes macroeconomic control variables (*i.e.*, the R-squared attributable to the changes in the alleged target price and in the macroeconomic variables) is higher than in the model without those variables (0.113 to 0.056). To the extent that the macroeconomic variables included in my regression do not perfectly control for the market forces that affect CRT prices, my regression provides a conservative estimate of the ability of changes in the alleged target prices to predict changes in actual prices.

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“Prof. Willig calculated the change in actual transaction prices in terms of U.S. dollars. Since many transactions were conducted and recorded in foreign currencies, fluctuations in exchange rates account for a share of the variation in prices which have been converted to U.S. dollars.”⁴⁰

43. However, adherence to target prices is most logically measured using U.S. dollars. This conclusion follows naturally from Dr. Netz’s allegation that the alleged cartel was orchestrated through the use of target prices that were denominated in U.S. dollars.⁴¹ In fact, she assumes that there was only a single global target price (expressed in U.S. dollars) for any given product (or set of products) at a particular point in time – not different target prices depending on the region of sale or the currency in which a particular price was negotiated. If there was only a single U.S. dollar-denominated (“USD”) target price for any given product (or set of products) at a point in time, then economic logic implies that in order for the alleged cartel to be effective, cartel members would be expected to adjust their negotiated prices (*i.e.*, prices expressed in the currency in which they were negotiated) in order to maintain adherence to the alleged USD target price, thus offsetting any exchange rate movements.

44. To see why, consider the following example. Suppose Panasonic negotiates all (or most) of its CPT prices in Japanese yen while Philips negotiates all (or most) of its CPT prices in U.S. dollars. Suppose further that Panasonic and Philips set their CPT prices according to a target price, which is expressed in dollars, but the yen subsequently depreciates relative to the dollar. If Panasonic and Philips did not change their negotiated prices, Philips’s price (which was negotiated in dollars) would be higher than Panasonic’s price (which was negotiated in the now-depreciated yen). If Philips’s and Panasonic’s CPTs are both used in TVs sold in the same country, say, the U.S., Panasonic’s TV manufacturer customers would now have a cost advantage over Philips’s TV manufacturer customers, which would likely cause Philips to lose sales to Panasonic.⁴²

⁴⁰ Netz Rebuttal Report, p. 38.

⁴¹ Netz Rebuttal Report, fn. 55.

⁴² This could happen by Philips’s customers switching from Philips to Panasonic, mutual customers shifting a larger share of their purchases to Panasonic, or Philips’ customers buying fewer CPTs while

(footnote continued ...)

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The economic logic of the alleged cartel suggests that Philips (and other similarly situated firms) would expect Panasonic to increase its negotiated price to bring its USD price back in line with the agreed upon target price. Otherwise, Philips would have a strong incentive to cheat on the alleged agreement by lowering its USD price in order to maintain sales.⁴³

45. The above example illustrates why the alleged cartel members would have had an economic incentive to adjust their negotiated prices even when those prices were denominated in a currency other than U.S. dollars to offset exchange rate movements in order to maintain cartel stability.⁴⁴ Consistent with this view, all of the evidence that Dr. Netz cites to support her claim that the alleged cartel members attempted to monitor each other's prices and punish members that deviated from the alleged target prices refer to actual prices expressed in U.S. dollars.⁴⁵ Because cartel members would be expected to adhere to the USD target prices, if cartel members closely adhered to the putative target prices, then changes in USD target prices should reliably predict changes in USD actual prices.

46. As a result, the measure of actual price changes that I rely upon in the econometric analysis I describe in my report, which compares USD actual and USD target price changes, is proper for assessing whether the cartel was uniformly effective over the course of the class period. My analysis shows that changes in USD target prices predict changes in USD actual prices extremely poorly, which is strong evidence that the alleged cartel was not consistently or even frequently effective.

(... footnote continued)

Panasonic's customers buy more (which would happen if Panasonic's customers were able to translate their cost advantage over Philips' customers into a larger share of finished product sales).

⁴³ At her deposition, Dr. Netz agreed that if the alleged cartel members adhered to the USD target prices, then they would have altered their prices negotiated in currencies other than USD in response to a change in exchange rates in order to keep their prices consistent with the putative USD target prices. (Netz Deposition, Vol. 2, p. 401.)

⁴⁴ Dr. Netz does not offer any opinion to the contrary.

⁴⁵ Netz Initial Report, fn. 181-183.

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47. Nevertheless, for further confirmation of my results, I added independent variables that control for changes in the exchange rate between the currency in which prices were negotiated (“negotiated-price currency”) and U.S. dollars to the econometric analysis presented in Exhibit 16 in my report.⁴⁶ These variables allow the model to account for any impact that changes in the exchange rate between the negotiated-price currency and U.S. dollars had on USD actual price changes. My qualitative results remain unchanged. Specifically, the R-squared statistic associated with this econometric model is 0.148. (See Exhibit 16A-R, row 5.) This R-squared is somewhat higher than in the model in which I do not control for exchange rate movements, which implies that when exchange rates fluctuated, the Defendants did not consistently adjust their CRT prices so as to adhere to the alleged USD target prices. However, an R-squared of 0.148 is still extremely low, indicating that changes in the target prices identified by Dr. Netz and changes in the exchange rates between the negotiated-price currency and U.S. dollars together explain only 14.8% of the variation in changes in CRT actual USD prices. Additionally, the estimated coefficient on the target price change in this model is 0.148, which implies that a 5 percentage point increase in the target price identified by Dr. Netz is, on average, associated with only a 0.74 percentage point increase in the actual price during the same time period.⁴⁷ Thus, even after controlling for the influence of exchange rate movements on USD actual price changes, the results of my econometric model demonstrate that the alleged cartel was far from uniformly effective (if at all).⁴⁸

48. Dr. Netz also criticizes the way in which I calculated changes in the alleged target prices for this analysis as follows:

⁴⁶ Specifically, I include the change in the exchange rate between the currency prices were negotiated in and the U.S. dollar and also interactions between this variable and a series of indicator variables that correspond to each of the currencies in which CRT actual prices represented in the Defendants’ CRT sales data were negotiated.

⁴⁷ The estimated coefficient on the change in the alleged target price is lower in the model that includes control variables for changes in the exchange rate between the currency in which prices were negotiated and U.S. dollars (Exhibit 16A-R, row 5) than in the model that does not (Exhibit 16A-R, row 1).

⁴⁸ I have conducted several robustness checks on this regression and none of the variations yield an R-squared above 0.153 or an estimated coefficient on the change in the alleged target price above 0.211.

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“In many cases, the target prices which Prof. Willig compares share the same application, size, finish, and manufacturer, but differ in other respects; for example, he often compares target prices for flat CRTs to those for curved CRTs. As a result, Prof. Willig frequently calculates changes in target prices when none have occurred or incorrectly calculates the magnitude of those that have.”⁴⁹

49. As an initial matter, my calculation of changes in target prices was based on the target prices that Dr. Netz compiled. Thus, her criticism represents an implicit acknowledgment that the target price database that she compiled is incomplete and subject to material errors.⁵⁰ As such, these data are not a basis to reliably assess common impact.

50. Moreover, although some of the variation in target prices may result from gaps in her target price data relating to product attributes other than manufacturer, application, size, finish, and shape, Dr. Netz alleges that all other attributes represent “economically very minor differences.”⁵¹ Specifically, she states:

“The product characteristics can be roughly grouped into three categories: finish, major price differentiators, and minor price differentiators. ... The major price differentiators are size and shape.”⁵²

If Dr. Netz is correct that size and shape are the only major price differentiators, then the fact that the average target prices she compiles by product group may be comprised of target prices for different sets of “minor” characteristics from one period to the next should not significantly distort the calculation of target price changes in the version of my analysis in which actual and target prices could be matched based on attributes that include size and shape. That is, if size and shape are the only characteristics that have a material influence on CRT prices, then a failure of changes in target prices to explain changes in actual prices once size and shape are taken into account cannot be attributable

⁴⁹ Netz Rebuttal Report, p. 37.

⁵⁰ As noted in footnote 82, although Dr. Netz contends that she has identified target prices associated with 26% of CRT sales during the relevant period, this figure is greatly overstated.

⁵¹ Netz Rebuttal Report, p. 12.

⁵² Netz Rebuttal Report, p. 12. Dr. Netz also refers to application, size, and shape as the only “meaningful price differentiators.” *Id.*, p. 13.

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to the gaps in the target price data Dr. Netz compiled. It can only be due to the alleged conspiracy being far from uniformly effective.

51. Dr. Netz completely ignores the fact that in my report I indicate that I conducted the same regression analysis of actual and target price changes on the subset of the Defendants' CRT sales data for which it was possible to identify the shape of the CRT (in addition to its size), and that this analysis yielded similar results to the analysis based on all the Defendants' data.⁵³ In particular, changes in the target prices identified by Dr. Netz explain roughly 4.8% of the variation in changes in the actual prices for corresponding CRTs, even when focusing on sales for which it is possible to match the actual prices and alleged target prices by manufacturer, application, size, finish, *and shape*. (See Exhibit 16A-R, row 6.) Additionally, the estimated coefficient on the target price change in this model is 0.186, which implies that a 5 percentage point increase in the target price identified by Dr. Netz is, on average, associated with only a 0.93 percentage point increase in the actual price during the same time period.⁵⁴ Thus, Dr. Netz is mistaken in claiming that the failure of changes in target price to explain changes in actual prices can be attributed to gaps in her target price data related to CRT shape.⁵⁵

⁵³ Willig Report, fn. 94. The programs for recreating this analysis were produced to Plaintiffs along with the backup to the other analyses in my report.

⁵⁴ I have conducted several robustness checks on this regression and none of the variations yield an R-squared above 0.065 or an estimated coefficient on the change in the alleged target price above 0.257. (See Exhibit 16A-R, row 6.)

⁵⁵ Conversely, if other product attributes besides size and shape – such as resolution, frequency, safety standards, mask type, neck diameter, and shipping terms – represent significant price differentiators, either individually or in combination, then, by minimizing the importance of these other attributes, Dr. Netz dramatically understates the extent of CRT product differentiation. Moreover, if these other attributes are significant price differentiators, Dr. Netz also would have failed to explain how the alleged cartel effectively coordinated on prices despite the fact that target prices were rarely differentiated along these other product dimensions. Even if one were to posit that the cartel members reached some sort of understanding regarding pricing along these other important product dimensions that was not reflected in the meeting minutes cited by Dr. Netz, Dr. Netz has not presented any methodology that could be used to assess whether the cartel adhered to pricing agreements not reflected in the target prices that she identified. As such, there would be no basis for concluding that classwide impact could be demonstrated through common proof.

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The Relationship between Actual and Target Price Changes Was Weaker for Transfer Sales than Merchant Sales.

52. In my report, I cite to what Dr. Netz refers to as “a widely used Industrial Organization economics textbook”⁵⁶ for the proposition that economists have identified the presence of varying degrees of vertical integration in an industry as a contributor to cartel instability.⁵⁷ Dr. Netz does not agree with this proposition and argues that cartelization is possible even in the presence of vertical integration.⁵⁸ However, what is relevant in the present context is whether the varying degrees of vertical integration in the CRT industry affect the likelihood that classwide impact could be demonstrated through common proof. Unlike Dr. Netz, in my report, I examine data related to this issue and show that changes in prices between vertically affiliated entities (“transfer prices”) exhibited an even weaker relationship with target price changes than did changes in prices between vertically unaffiliated entities (“merchant prices”).

53. Specifically, I examined whether there was any difference between (a) the ability of target price changes to predict changes in transfer prices, and (b) the ability of target price changes to predict changes in merchant prices. I found that although target price changes predicted merchant price changes very poorly, there was a small, positive statistical relationship between these two price series. In contrast, I found that target price changes were an even worse predictor of transfer price changes and that the relationship between these two price series was not statistically significantly different from zero.⁵⁹ As I note in my report, this finding “supports the hypothesis that the alleged

⁵⁶ Netz Initial Report, p. 43 and fn. 151.

⁵⁷ Willig Report, ¶¶ 85-86, fn. 82.

⁵⁸ Netz Rebuttal Report, pp. 25-26.

⁵⁹ Willig Report, ¶¶ 97-100. I have incorporated into my analysis the additional alleged target prices identified by Dr. Netz since I filed my report. As before, I find that whereas actual and alleged target prices exhibit a weak relationship for merchant CRT sales (the R-squared is 0.061 and the estimated coefficient on the change in the alleged target price is 0.171 and statistically different from zero), they exhibit an even weaker relationship for transfer CRT sales (the R-squared is 0.000 and the estimated coefficient on the change in the alleged target price is -0.0001 and *not* statistically different from zero). (See Exhibit 16A-R, rows 2-3.) As a robustness check, I have estimated several alternative versions of

(footnote continued ...)

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target price-setting process was even less effective in the context of sales to downstream affiliates than in the context of sales to unaffiliated finished product manufacturers.”⁶⁰

54. Dr. Netz concedes that she has not performed any specific comparisons of merchant and transfer prices.⁶¹ Dr. Netz also does not contest my finding that the changes in the alleged target prices are an even worse predictor of changes in transfer prices than changes in merchant prices. She does assert that the manner in which I calculated actual price changes and target price changes introduces spurious variation into both series. For the reasons described above, these assertions are without merit. However, even if one were to accept her assertion that some spurious variation was introduced into the actual and target prices, it would imply only that I understated the ability of target price changes to predict actual price changes, but it would not explain my finding that target price changes are demonstrably worse predictors of actual transfer price changes than of actual merchant price changes.

55. As discussed in my report, one reason that the Defendants might have been less likely to adhere to the alleged target prices when selling to affiliated downstream finished product manufacturers is that the transfer price paid by those affiliates was likely to have been opaque to other CRT manufacturers, thus enabling integrated firms to deviate from cartel agreements with a relatively lower risk of detection and penalties for such cheating.⁶² In her rebuttal report, Dr. Netz responds,

(... footnote continued)

these regressions and find that the R-squared and estimated coefficient on the change in the alleged target price are substantially lower when I implement the model for transfer CRT sales. *Id.*

⁶⁰ Willig Report, ¶ 100.

⁶¹ Netz Deposition Vol. 2, pp. 375-376 (**Q.** Okay. And have you examined -- have you done any separate analysis of transfers of CRTs to affiliated finished goods manufacturers to see if the pricing was any different than it was for sales to other affiliated companies? Have you done any comparisons like that of prices? **A.** Not specifically comparisons as we discussed in my first deposition.)

⁶² Willig Report, ¶ 97.

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“The vertically integrated firm has no incentive to ‘cheat’ on the cartel agreement by setting a low transfer price because the process is analogous to an individual moving money from one pocket to another pocket.”⁶³

56. However, by the same logic, the vertically integrated firm has no incentive to elevate the price that the CRT manufacturer charges an affiliated finished product manufacturer in the first place. Dr. Netz appears to agree and states that

“[O]ther cartel members have no incentive to monitor the internal transfer prices of a vertically integrated firm.”⁶⁴

However, if transfer prices are not particularly important to the alleged cartel members, then the only way they could try to ensure vertically integrated CRT manufacturers adhered to the alleged agreement would be to monitor the affiliated downstream finished product manufacturers’ prices to ensure that they remained above an agreed upon benchmark. However, I understand that Plaintiffs are not alleging a conspiracy to elevate finished product prices, and I am not aware of any evidence indicating that the alleged cartel either agreed to or attempted to enforce an agreement on finished product prices. Similarly, I am not aware of – and Dr. Netz does not present – any evidence indicating that alleged cartel members frequently cited a finished product manufacturer’s prices as evidence that its upstream affiliated CRT manufacturer had cheated on the alleged agreement on CRT prices. As a result, the evidence indicates that the alleged cartel would not have had the same impact on transfer CRT prices as merchant CRT prices. Moreover, Dr. Netz provides no evidence or even a coherent explanation of her implicit assumption that evidence that the cartel elevated prices for merchant CRT sales would necessarily imply that it also elevated prices for transfer CRT sales.

⁶³ Netz Rebuttal Report, pp. 26-27.

⁶⁴ Netz Rebuttal Report, p. 27. Dr. Netz also states that when a CRT manufacturer sells a CRT to an affiliated finished products manufacturer, “there is no economically meaningful sale.” *Id.*, p. 26. See, also, Netz Deposition Vol. 2, p. 375.

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Dr. Netz's New Comparisons of Actual Prices of CRTs Manufactured or Sold in North America to the Alleged Target Prices Do Not Remedy the Unreliability of Her Methodologies for Assessing Whether the Alleged Cartel Elevated Price for Any or All CRTs Sold in North America.

57. In her initial report, Dr. Netz performed no analysis to establish that target CRT prices that she identified actually applied to North America, nor did she examine whether CRT price movements inside and outside North America tracked one another such that target prices that were not specifically relevant for North America could nonetheless affect North American customers. In my report, I criticize Dr. Netz for assuming that all of the alleged target prices she identified were relevant for CRTs manufactured or sold in North America even though only a handful of the target price documents she cited even reference North America or the U.S. I also explain that market conditions in North America were evidently substantially different from those in many other parts of the world because of the earlier and greater impact of flat screen competition (for example).^{65, 66}

58. In her declaration, Dr. Netz contends that the target CRT prices she identified applied to North America. (“I have compared actual prices of CPTs made in North America to cartel target prices for CPTs and I find significant matching. This record evidence supports the conclusion that the cartel target prices applied to tubes manufactured in the U.S.”⁶⁷)

59. However, the results of Dr. Netz’s comparison have no bearing on the reliability of her methodology for assessing whether the cartel elevated prices for CRTs sold in North America because the “results” could just as easily be attributable to the undisputed bias in her actual-to-target price comparisons. As noted above, Dr. Netz does not contest

⁶⁵ Willig Report, ¶¶ 65-66.

⁶⁶ In her rebuttal report, Dr. Netz acknowledges that CRTs were constrained geographically, *i.e.*, the same CRT could not be used in any and all regions of the world because of factors such as differences in broadcast standards across countries, differences in shielding, and differences in the Earth’s magnetic field. (Netz Rebuttal Report, pp. 52-53.)

⁶⁷ Netz Declaration, p. 12.

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my opinion that her comparison of actual prices and alleged target prices is biased towards mistakenly finding that actual prices are close to or above the allegedly applicable target prices because her “target” prices typically pertain to more basic models of CRTs.⁶⁸ Thus, Dr. Netz’s comparison of actual prices and target CRT prices in the NAFTA region does not settle the issue of the impact of the alleged cartel on U.S. customers, nor does it establish that CRT price dynamics in North America were similar to those in other parts of the world.

60. The most direct test of differentiated price dynamics consists of comparing changes over time in CRT prices in North America with changes in CRT prices in other regions. If changes in North American CRT prices were not highly correlated with changes in CRT prices in other regions such that when CRT prices increased in North America, CRT prices elsewhere frequently decreased, then that is strong evidence that market forces in North America were differentiated from the rest of the world.

61. In my report, I provide such a test and demonstrate that prices of CPTs sold in North America had substantially different patterns of changes than prices of CPTs sold in the rest of the world.⁶⁹ In her rebuttal report, Dr. Netz claims that this analysis is flawed because it measures CPT prices in U.S. dollars, and it is thus affected by fluctuations in exchange rates.⁷⁰ For reasons I explain in paragraphs 84 to 87 below, the heterogeneity in CRT price changes is appropriately analyzed using U.S. dollars. Nonetheless, to further confirm my results, I also examined the extent of divergence in CPT price movements in North America and the rest of the world when those prices are expressed in the currency in which they were negotiated. The results of this analysis, which are presented in Exhibits 9-R, clearly demonstrate that there was a substantial amount of divergence between movements in negotiated CPT prices in North America as compared to the rest of the world. For example, in the months that experienced the greatest changes in average negotiated CPT prices (measured in terms of the Fisher Price Index) sold outside North

⁶⁸ See ¶ 23 above and also Willig Report, ¶¶ 103-104.

⁶⁹ Willig Report, Exhibit 9.

⁷⁰ Netz Rebuttal Report, p. 54.

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America, 53% of negotiated CPT prices (weighted by sales volume) sold in North America changed in the opposite direction or did not change.⁷¹ These results reinforce my conclusion that market forces in North America that affected CPT prices were different from the market forces that affected CPT prices in the rest of the world.

Dr. Netz's Failure to Perform any Analysis of But-For Prices, at a Minimum, Leaves Open the Possibility that a Substantial Number of Class Members Were Not Injured.

62. I previously concluded that, because Dr. Netz has not estimated any but-for (*i.e.*, competitive) prices, she has not provided any information that would allow a fact-finder to determine which, if any, CRT sales were priced above the competitive level and thus has not demonstrated that the alleged cartel's conduct resulted in classwide impact.⁷² Because she has not estimated but-for prices, her analysis is incapable of ruling out the possibility that some CRT prices were elevated above the competitive level, while others were not.

63. Dr. Netz responds that it is not necessary to estimate a but-for price to determine whether the cartel had common impact. In particular, she asserts in her declaration that "[j]ust as it is possible to infer whether one car is going faster than another car without knowing the precise speed of either car, evaluation of whether the but-for price is likely to have been lower than the actual price does not require providing a measurement of the but-for price."⁷³ However, Dr. Netz's analogy makes no sense in the present context; neither the economist nor the fact-finder can observe the "other car," which in this case is the but-for price.

64. Inapt analogies aside, Dr. Netz has not demonstrated that all (or even most) CRT prices were above the corresponding but-for prices, nor has she demonstrated that such a showing would be possible using common (or even individualized) evidence (as I explain

⁷¹ See Exhibit 9-R.

⁷² Willig Report, ¶109.

⁷³ Netz Declaration, p. 14. See also, Netz Rebuttal Report, p. 57.

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in my report⁷⁴). She presents no empirical analysis that would even be capable of supporting such a claim. The most seemingly germane analysis she presents is her comparison of actual and target prices. However, this comparison fails to demonstrate that actual prices were above the competitive level for the three reasons documented at length above: (i) she has not established that the preponderance of alleged target prices were above the corresponding but-for prices;⁷⁵ (ii) she does not contest my finding that her comparison of actual and alleged target prices is biased towards mistakenly finding that actual prices were above the allegedly applicable target prices; and (iii) she does not contest my finding that, even ignoring the inherent bias in her comparison, a majority of actual prices were below the alleged applicable target prices. As a result, her comparison of actual prices and alleged target prices is incapable of demonstrating that any, much less most or all, actual CRT prices were above the corresponding but-for prices.⁷⁶

65. The other evidence and arguments that Dr. Netz presents to support her claim that “CRT prices would therefore have been lower in the but-for world than they were in the actual world” also fail to demonstrate that classwide impact could be demonstrated with common proof. For example, Dr. Netz states that, because participating in an illicit cartel entails taking on risks, rational cartel members would not have participated in the alleged cartel for as long as they allegedly did unless they were successful in elevating the price of CRTs. However, at best, this rationale implies that the alleged cartel was effective at elevating prices for *some* products or during *some* time periods. In fact, Dr. Netz conceded at her deposition that it could be rational for firms to participate in a cartel even if the cartel were only effective at increasing prices for some product sizes, in some

⁷⁴ Willig Report, ¶¶145-160

⁷⁵ Even if actual prices were mostly above target prices, that is not evidence that actual prices exceeded but-for prices because Dr. Netz has acknowledged that unexpected changes in market conditions could cause but-for prices to be higher than the alleged target prices. See ¶¶ 35-37 above.

⁷⁶ Dr. Netz conceded at her deposition that her target price analysis by itself would not lead her to conclude that the alleged cartel affected CRTs whose prices were at least 15% below the allegedly applicable target price she identified. (Netz Deposition, Vol. 2, pp. 354-355.) Defendants sold at least 22.5 million CRTs, or 12.5% of the CRT sales included in Dr. Netz’s target price analysis, at prices that were more than 15% below the allegedly applicable target price identified by Dr. Netz.

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regions, or for some customers.⁷⁷ Similarly, Dr. Netz cites to several documents in which Defendants allegedly proclaimed that the putative cartel had successfully elevated prices. However, all of the documents that Dr. Netz cites refer to a narrow (or vague) set of products and/or time period and thus, at most, they demonstrate that the alleged cartel was effective at elevating prices for *some* products or during *some* time periods. As a result, this putative evidence is incapable of serving as a common basis from which to establish that the alleged cartel elevated all (or most) CRT prices above the competitive level.

66. In sum, Dr. Netz has not estimated but-for prices, and she presents no methodology that reliably could be used to assess which, if any, of the actual prices that were below the alleged target prices were nevertheless above the corresponding but-for prices. Instead, she offers fragments of evidence that at most indicate that the alleged cartel was effective at elevating prices for *some* products or during *some* time periods, but provide no basis to infer *classwide* impact. As a result, her assertion that all CRT prices were elevated above the competitive level amounts to an unsupported assumption.

B. Dr. Netz’s Assumptions and Methodologies to Claim a “Price Structure” in CRT and CRT Finished Product Markets

Dr. Netz Has Failed to Provide Even Rudimentary Evidence to Establish That a “Price Structure” Exists.

67. In her declaration, Dr. Netz claims that she “... applied textbook economic logic to the record evidence to show that the cartel had the incentive to cause all prices to be supracompetitive, that a market mechanism provided the means for the cartel to cause impact to the entire price structure without setting target prices for all CRTs, and that the cartel meeting notes indicate Defendants explicitly created structure in its target prices by setting price differentials.”⁷⁸

⁷⁷ Deposition of Janet S. Netz, November 15, 2012 (“Netz Deposition Vol. 1”), pp. 153-154.

⁷⁸ Netz Declaration, p. 14.

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68. Dr. Netz defines a “price structure” such that it implies that the relative prices across CRTs would be approximately the same in the actual and but-for worlds at a given point in time.⁷⁹ In other words, the existence of a price structure implies that if the average price of CRT A is twice the average price of CRT B in the actual world in a given month, then the average price of CRT A would also have been about twice the price of CRT B in the but- for world in the same month (although both CRTs allegedly would have been priced lower in the but-for world than in the actual world). According to Dr. Netz, one implication of the alleged existence of a price structure is that, if the cartel successfully elevated the price of CRT A, then CRT B’s price must have been elevated by approximately the same percentage even if the cartel did not explicitly target the price of CRT B. In effect, Dr. Netz’s concept of a price structure implies that the alleged cartel had about the same impact on all CRTs, *i.e.*, prices of all CRTs were elevated by approximately the same percentage.

69. As noted in my report, Dr. Netz’s concept of a “price structure” is not a standard concept found in the economics literature, and the establishment of a “price structure,” however defined, as evidence that a class should be certified is not an approach generally accepted by economists.⁸⁰ Indeed, Dr. Netz admitted at her deposition that she is unaware of any peer-reviewed article that uses the term “price structure” in the context of an unregulated industry (*i.e.*, an industry in which prices/fares are not determined by an external government authority).⁸¹

70. Nonetheless, the purported existence of a “price structure” is clearly central to her opinion that the alleged cartel had a classwide impact. That is, although Dr. Netz readily

⁷⁹ Netz Rebuttal Report, p. 39. (“The relative prices that are reflected in the price structure are substantially the same in the actual world as in the but-for world. Relative prices are ratios of prices at a point in time; if both prices change by the same percentage, the relative price is unchanged.”)

⁸⁰ See, *e.g.*, Johnson, J. H., & Leonard, G. K. (2008). In the Eye of the Beholder: Price Structure as Junk Science in Antitrust Class Certification Proceedings. *Antitrust*, volume 22 (no 3). pp. 108-112.

⁸¹ Netz Deposition Vol. 2, pp. 386-389.

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acknowledges that she is able to identify target prices for only a fraction of CRT sales,⁸² she claims that prices of *all* CRTs – including CRTs not mentioned in the documents Dr.

⁸² Dr. Netz contends that she has identified target prices associated with 26% of CRT sales during the relevant period. (Netz Rebuttal Report, p. 42.) However, this figure is greatly overstated for two reasons. First, with some exceptions, Dr. Netz assumes that a target price applied to each Defendant regardless of whether it was present at the meeting at which the target price was allegedly decided. For example, Dr. Netz identifies a number of alleged target prices based on the minutes of an August 1999 meeting attended by IRICO, Orion, and Chunghwa. (CHU00030827E) She then assumes that these target prices applied to all of the Defendants even though only IRICO, Orion, and Chunghwa were in attendance according to the document relied on by Dr. Netz. Dr. Netz then proceeds to match the target prices to sales by Defendants that were not at the meeting, such as Toshiba, Panasonic, and SDI, and treats those sales as “covered” by the target prices she identified. (In her deposition, Dr. Netz acknowledged that this is the approach she adopted and that it increases her reported target price coverage. See Netz Deposition, Vol.2, pp. 308, 322.) As a result, Dr. Netz’s 26% estimate includes a substantial number of sales that Dr. Netz simply assumes were covered by the identified target prices even though she provides no evidence that the manufacturer that made those sales ever had any discussions about – much less agreed to – the alleged target price. Second, Dr. Netz’s calculation represents “the share of all unit sales in [Defendants] data which match a target price on application, size, and date.” (Netz Rebuttal Report, fn. 154). As a result, if Dr. Netz identifies an alleged target price for a CRT for a particular application, size, and date, she assumes that it “covers” all sales of CRTs of that application and size sold during that specified month. The alleged target price may refer explicitly or implicitly to a particular finish, shape, resolution, frequency, safety standards, mask type, neck diameter, and/or shipping terms, but for the purposes of calculating the share of CRT sales “covered” by the alleged target prices, Dr. Netz does not consider whether the models sold share any of those attributes with the alleged target prices. For example, Dr. Netz identifies the finish associated with each alleged target price, but then assumes that a target price for CRT with a deflection yoke (ITC finish) covers the sale of a CRT without a deflection yoke (bare finish). (In her deposition, Dr. Netz acknowledged that this is the approach she adopted and that it increases her reported target price coverage. See Netz Deposition, Vol.2, pp. 321-322.) If Dr. Netz’s calculation of the share of CRT sales “covered” by the alleged target prices is modified to include only sales and target prices with the same finish (in addition to correcting for the aforementioned error relating to Defendants that did not attend meetings in which alleged target prices were set), the share drops from 26% to 15%. Similarly, Dr. Netz identifies the shape associated with each alleged target price, but then assumes that a target price for a curved CRT covers the sale of a flat CRT. Although it is not possible to determine the shape of the CRT model in every Defendant’s sales data; the data for three of the Defendants, Panasonic, MTPD, and SDI, do in some cases identify the shape of the CRT model. If Dr. Netz’s calculation of the share of CRT sales made by Panasonic, MTPD, and SDI that were “covered” by the alleged target prices is modified to include only sales and target prices with the same shape (in addition to correcting for the aforementioned errors relating to finish and Defendants that did not attend meetings in which alleged target prices were set), the share covered drops to 9%. The share of CRT sales “covered” by the alleged target prices would be even lower if it were also limited to include only sales and target prices with the same resolution, frequency, safety standards, mask type, neck diameter, and/or shipping terms, although it is not possible to measure how much lower given the data available. In sum, Dr. Netz overstates the share of CRT sales covered by the alleged target prices she identified by at least 189% and likely much more.

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Netz relies on to identify target CRT prices allegedly set by Defendants – were elevated because the alleged “price structure” links prices of all (or nearly all) CRTs.⁸³

71. The primary evidence that Dr. Netz provides in her initial and rebuttal reports for the existence of such a “price structure” is a set of hedonic price regressions. In her declaration, Dr. Netz claims that “Defendants wrongly criticize me for using a hedonic regression analysis instead of a correlation analysis to evaluate the price data in forming my conclusion. This is misguided. ... In my expert judgment, I determined that the hedonic regression analysis was the most appropriate method given the question of interest and data available.”⁸⁴

72. Simply put, these hedonic regressions purport to show that sales prices (in the actual world) of most CRTs can be reliably predicted by a small set of product features (size, aspect ratio, and finish),⁸⁵ a time trend and the identities of customers and sellers. From this claimed fact, Dr. Netz concludes that there exists a price structure.⁸⁶ The only other evidence Dr. Netz offers in support of a price structure is a set of documents that she uses to identify target prices which she cites as evidence that “the cartel explicitly created structure in its target [CRT] prices by setting price differentials [between CRTs].”⁸⁷ Dr. Netz uses the putative target prices to estimate a set of target price hedonic regressions as further evidence that the alleged cartel set differentials across target prices associated with various CRTs and that a few CRT features and a time trend explain most of the variation in target prices.⁸⁸

73. The fundamental flaw in Dr. Netz’s argument is that even if she were correct in her view that her sales price hedonic regressions show that a small set of product features,

⁸³ Netz Initial Report, p.71.

⁸⁴ Netz Declaration, p. 14. See also Netz Initial Report, p.66-71.

⁸⁵ “Finish” refers to whether or not the CRT contains a deflection yoke when it is sold to a customer. A “bare” CRT is one that does not contain the deflection yoke and an “ITC” CRT is one that does contain the yoke.

⁸⁶ Netz Initial Report, p.71; Netz Rebuttal Report, pp. 42-43.

⁸⁷ Netz Rebuttal Report, p. 42.

⁸⁸ Netz Initial Report, pp. 68-9

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a time trend, and the identities of customers and sellers explain most of the variation in CRT sales prices, it would not establish the “price structure” of the sort claimed by Dr. Netz. All that her sales price hedonic regressions would establish is that the relative price of CRT A to CRT B was likely similar to the relative price of CRT A to CRT C in the actual world if CRT B and CRT C had similar characteristics. It would provide no indication whatsoever that the relative sales price of CRT A to CRT B or CRT A to CRT C would be the same in the but-for world as in the actual world, which is what Dr. Netz would need to show to establish her claim that “[t]he relative prices that are reflected in the price structure are substantially the same in the actual world as in the but-for world.”⁸⁹

74. For instance, Dr. Netz’s sales price hedonic regressions – using data from the class period – estimate that, across all manufactures and all months in the class period, 29-inch CPTs were on average priced 327% higher than 14-inch CPTs for a given buyer, seller, month, aspect ratio, and finish.⁹⁰ All one can conclude from this is that in the actual world during the class period, 29-inch CPTs commanded an average sales price premium of 327% over 14-inch CPTs with comparable characteristics. However, nothing in this analysis sheds any light at all on the average price premium that 29-inch CPTs would have had over 14-inch CPTs in the but-for world. In order to determine premiums in the but-for world, Dr. Netz would have had to estimate but-for prices and shown that the price premium for 29-inch CPTs relative to 14-inch CPTs would have been about 327%. However, Dr. Netz has not done anything to show that relative but-for prices are in any way similar to actual relative prices. As such, Dr. Netz’s sales price hedonic analysis provides no support for her claim that there was a price structure for CRTs, *i.e.*, that relative prices would have been the same in the but-for world as in the actual world.

75. Similarly, even if Dr. Netz were correct that the alleged cartel set target price differentials between different categories of CRTs, that would at most establish that the cartel hoped to achieve certain relative prices between pairs of CRT categories *in the actual world*. It would not provide any evidence whatsoever that the relative prices

⁸⁹ Netz Rebuttal Report, p. 39.

⁹⁰ Calculated based on Netz Initial Report, Exhibit 22.

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between CRT categories in the but-for world would have been the same as the allegedly targeted relative prices in the actual world – even if those target prices were uniformly adhered to by the alleged cartel members. As a result, Dr. Netz’s approach is fundamentally incapable of establishing that a price structure exists.

CRTs Were Highly Differentiated.

76. A price structure of the sort claimed by Dr. Netz is highly unlikely in part because CRTs were widely differentiated by features such as application (TVs or computer monitors), size, shape, resolution, the inclusion or exclusion of deflection yokes, type of mask, electrical properties, and the extent and type of customization. CRT prices also often varied based on the region in which the CRT was manufactured and the region in which it was sold. In my report, I demonstrate that this translated into a substantial amount of dispersion in each month during the class period in the actual CRT prices.⁹¹

77. I also document the large degree of variation in CRT finished product pricing within and across retailers.⁹² CRT finished product prices varied widely based on the aforementioned characteristics of the CRT, as well as on the type of sound system, HDTV capability, picture-in-picture capability, whether the product included a built-in VCR and/or DVD player or was bundled with a desktop PC, the retailer, and the time period.⁹³

78. In her declaration, Dr. Netz does not contest my showing that there was substantial heterogeneity in prices across CRT finished products sold in the U.S. She does, however, argue in her rebuttal report that the way I graphically present CRT price dispersion overstated the heterogeneity in CRT prices because the average price for each

⁹¹ Willig Report, ¶¶ 15, 18, 68, Exhibits 1A and 9.

⁹² Willig Report, ¶¶ 20, 44 and Errata Exhibit ER-1B.

⁹³ Willig Report, ¶ 39.

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CRT model, customer, and month is presented as a single data point, regardless of the associated sales volume.⁹⁴

79. However, weighting prices by sales volume does not alter my conclusion that CRT prices in any given month exhibited substantial heterogeneity. For example, on average, the 90th percentile of the sales-volume-weighted distribution of CRT prices in a given month was 71% higher than the weighted average CRT price for that month, and the 10th percentile of the distribution was 56% below the average price. Put differently, on average, the 90th percentile of the sales-volume-weighted distribution of CRT prices in a given month was roughly four times as expensive as the 10th percentile. Thus, it is clear that a substantial *volume* of CRTs' prices were widely dispersed.^{95, 96}

80. Dr. Netz attempts to downplay the degree of price variation by claiming that, among CRT product characteristics, "only application, size, and shape were meaningful price differentiators," and thus CRT prices primarily differ only along three dimensions.⁹⁷

⁹⁴ Netz Rebuttal Report, pp. 7-8.

⁹⁵ Dr. Netz presents a sales-volume-weighted distribution of CRT prices for a single month, August 2001, in Exhibit 2 of her rebuttal report. In August 2001, more than 20% of CRT sales volume was priced at least 50% above or below the weighted average price for that month.

⁹⁶ Dr. Netz attempts to support her unreliable methodology by trying to whittle down this evident variation by presenting charts depicting the pricing variation in a particular month by a progressively narrower set of product characteristics (*e.g.*, her Exhibit 9 depicts the distribution of August 2001 prices for 29-inch CPT sales by shape). (Netz Rebuttal Report, Exhibits 2-13) It is not surprising that prices exhibited less variation for sales of a particular type of CRT than across all CRT sales. However, Plaintiffs have proposed a class of indirect purchasers of CRT finished products that were manufactured using vastly different types of CRTs. Thus, as a starting point in an assessment of whether all of these purchasers should be included in a single class, it is relevant to understand the substantial heterogeneity in prices at any given time across all CRTs included in the products purchased by the proposed class, not just the heterogeneity across all CRTs of a particular type. Dr. Netz similarly masks the substantial amount of product differentiation among CRTs when she states that in most years, the five top-selling CRT "product families" or each Defendant account for the vast majority of its CRT sales. (Netz Rebuttal Report, p. 10 and Exhibit 14.) As an initial matter, Dr. Netz's analysis is actually based on the top ten product families – five CPT families and five CDT families – for each Defendant and year. More importantly, Dr. Netz's analysis does not address the degree of heterogeneity in CRT prices across product families for a given Defendant, much less the degree of CRT product or pricing differentiation *across* product families for the fourteen alleged cartel members. (There is no overlap in top-selling product families across the four Defendants considered in Dr. Netz's analysis.)

⁹⁷ Netz Rebuttal Report, pp. 12-13.

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This response is irrelevant as a matter of economic logic, as market conditions can vary widely even for products that only vary along three dimensions, particularly if differences along those dimensions have a significant impact on cost or demand.

81. Dr. Netz's claim is also incorrect as an empirical matter. Although Dr. Netz states that a CRT's finish (whether a CRT is shipped with a deflection yoke ("ITC") or without it ("bare")) should be thought of differently from size and shape, a CRT's finish clearly has a significant effect on its price.⁹⁸ Moreover, the remaining characteristics of a CRT transaction, including the alleged "minor" product attributes and also the identity of the buyer and seller, account for a substantial amount of heterogeneity in CRT pricing. For example, suppose a "product group" is defined as a unique combination of application, finish, size, and shape. Then for a particular product group and month, the top quartile of CRT prices (weighted by quantity) are between 11% and 60% more expensive than the bottom quartile of CRT prices. This variation in CRT prices is due to the allegedly "minor" CRT characteristics. Clearly, these CRT features can have a substantial impact on prices and are a considerable source of price variation, contrary to Dr. Netz's claim.⁹⁹

82. In sum, the evidence is clear that there was a substantial amount of dispersion in CRT prices at any given point in time during the class period. This evidence, together with the evidence of heterogeneous CRT price movements described below, makes the existence of Dr. Netz's so-called price structure highly unlikely.

⁹⁸ Dr. Netz's hedonic analyses, for example, estimate that, all else equal, a CRT with a deflection yoke already mounted is on average 15.7% more expensive and a CRT with a deflection yoke already mounted is on average 10.2% more expensive. In fact, if one were to accept the accuracy of the coefficient estimates in her hedonic analyses (if not her interpretation of the implications), one would be led to conclude that the aspect ratio, the brand, and the identity of the customer are all "major price differentiators" for CRTs. (Netz Initial Report, Exhibits 21-22)

⁹⁹ It should be noted that this analysis was conducted across only Panasonic, MTPD, and SDI, which are the three Defendants whose CRT sales data in some cases identify the shape of the CRT model.

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There Was Substantial Heterogeneity in Price Movements across CRTs.

83. If there were substantial heterogeneity in price movements across CRTs (*i.e.*, relative prices across CRTs changed materially over time), then it is highly likely that different CRTs were affected by different market forces or were affected by the same market forces differently. Under these conditions, a price structure of the sort claimed by Dr. Netz is highly unlikely.

84. Clearly, relative prices must be measured in a common currency in order to achieve an apples-to-apples comparison, and the same is true of a comparison of price changes across products. In my report, I use U.S. dollars in my analysis of price changes because Dr. Netz alleges that the putative cartel was orchestrated through the use of target prices that were denominated in U.S. dollars.¹⁰⁰ U.S. dollars are the natural choice also because members of the proposed class of indirect purchasers are located in the U.S., and they paid for their finished products in U.S. dollars. (Nonetheless, my results are identical regardless of which common currency is used.)

85. Dr. Netz does not dispute my finding that USD prices for CRTs exhibited substantial diversity in price movements. Moreover, she does not contest my opinion that some of this diversity in CRT price changes was caused by differences in market forces across various CRTs.¹⁰¹ However, she asserts that some of the underlying transactions were negotiated in foreign currencies and thus “any change in the U.S. dollar price of a product over time reflects a change in the negotiated price (*i.e.*, prices expressed in the currency in which they were negotiated), a fluctuation in the exchange rate, or both.”¹⁰² Put differently, Dr. Netz has articulated the view that even if the same market forces applied to all CRTs, USD price changes would exhibit a substantial amount of heterogeneity as a result of exchange rate movements.

¹⁰⁰ Netz Rebuttal Report, fn. 55.

¹⁰¹ Netz Rebuttal Report, p. 46.

¹⁰² Netz Rebuttal Report, p. 17.

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86. However, if the same market forces applied to all CRTs, one would expect USD price changes to be similar across all CRTs even if some prices were negotiated in foreign currencies. This is true even in the presence of exchange rate movements. Put differently, if exchange rates fluctuated and prices were subsequently renegotiated in a way that did not restore the previous relative USD prices across CRTs, it would imply that the CRTs were affected by different market forces or were affected by the same market forces differently (possibly because the customers were located in different countries and sold finished products to end users in different countries).

87. Thus, if CRTs were subject to broadly similar market forces, one would expect to observe little heterogeneity in monthly USD price changes across all CRTs. Yet, as the analyses presented in Exhibits 2A, 3A, and 9 of my report clearly illustrate, USD price changes exhibited a substantial amount of heterogeneity across CRTs, with some prices increasing, others decreasing, and the rest remaining relatively constant.

88. In order to further confirm my findings, I also examine the extent of heterogeneity in changes in negotiated prices (*i.e.*, prices expressed in the currency in which they were negotiated). The results of these analyses, which are presented in Exhibits 2A-R, 3A-R, and 9-R, clearly illustrate that even when prices are expressed in the currencies in which they were negotiated, price changes exhibited a substantial amount of heterogeneity across CRTs, with many prices increasing and many other prices decreasing in the same month.

- a) In more than 80% of the months during the class period, the month-to-month price changes of CRT products ranged from increases of more than 5% to decreases of more than 5%. (See Exhibit 2A-R.)
- b) In roughly half of the months during the class period, at least 20% of CRT prices declined (month-over-month) by 2% or more while at least 20% of CRT prices increased or remained unchanged during the same period. (See Exhibit 2A-R.)
- c) For every CRT category, in the 25% of months during the class period in which its average prices changed the most, between 39% and 61% of the prices in every other CRT category changed in the opposite direction or did not change. (See Exhibit 3A-R.)
- d) For every CRT category, in the 25% of months during the class period in which its average prices changed the most, between 29% and 52% of prices in

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that CRT category changed in the opposite direction or did not change. (See Exhibit 3A-R.)

- e) In the 25% of months that experienced the greatest changes in average CPT prices (measured in terms of the Fisher Price Index) sold outside North America, 53% of CPT prices in North America either changed in the opposite direction or did not change at all. (See Exhibit 9-R.)

89. These results reinforce my conclusion described in my report that CRT price movements varied widely within and across different segments of the CRT marketplace, including by CRT application (CPT or CDT), size, shape, and the geographic region in which it was sold.¹⁰³ As noted above and in my report, the observed heterogeneity in price movements indicates that different CRTs were affected by different market forces (or by the same market forces differently), which is inconsistent with the alleged existence of a price structure for CRTs.¹⁰⁴

Dr. Netz Does Not Contest the Substantial Heterogeneity in Price Movements across CRT Finished Products.

90. In my report, I documented the highly differentiated price dynamics for CRT finished products. In particular, I demonstrated that price changes of individual CRT TVs, computer monitors, and desktop PC/monitor bundles varied greatly within and across retailers and also within and across finished product segments – with prices of different CRT finished products often moving in opposite directions.¹⁰⁵ As I discussed in my report, the substantial variation in the changes in the prices of CRT finished products implies that allegedly knowing that prices of a subset of CRT finished products increased as a result of the alleged cartel during a certain period would not be a basis to reliably infer that prices of all (or most) other CRT finished products were also impacted by the alleged cartel.¹⁰⁶ It is therefore important to note that in her declaration and her rebuttal report Dr. Netz does not contest the accuracy and relevance of my showing that there was

¹⁰³ Willig Report, ¶¶ 17-18.

¹⁰⁴ Willig Report, ¶¶ 14, 21-23, 53.

¹⁰⁵ See, e.g., Willig Report, ¶ 20.

¹⁰⁶ Willig Report, ¶¶ 47-48.

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substantial heterogeneity in price movements across CRT finished products sold in the U.S.

Dr. Netz's Own Sales Price Hedonic Analyses Undermine Her Claim of a Price Structure.

91. A “price structure” of the sort claimed by Dr. Netz in her declaration and in her rebuttal report cannot exist if prices in different segments of CRTs were affected by materially different market forces such that the ability and incentive of the alleged cartel to affect CRT prices differed across CRT segments. For example, if the alleged cartel substantially elevated the prices of some CRTs but failed to elevate prices of other CRTs (or elevated them less) because the latter had better substitutes and faced greater competition from alternative technologies, then relative prices in the actual and but-for worlds would be quite different – precisely the opposite of what Dr. Netz’s price structure would require.

92. As I describe in my report, Dr. Netz’s own sales price hedonic regressions provide evidence that relative price premiums commanded by larger CPTs over smaller CPTs varied considerably over time, which is strong evidence that market conditions differed materially between large and small CPTs. For example, in my report I explain that annualized versions of Dr. Netz’s sales price hedonic regressions show that, in 1995, 29-inch CPTs were priced 104% above 21-inch CPTs on average. By 2000, this premium increased to 207%, after which it declined to 147% the following year and declined further thereafter.¹⁰⁷ Clearly, the relative prices of CPTs of different sizes varied substantially even during short time periods.

¹⁰⁷ Willig Report, ¶ 75 and Exhibit 11A. In her Rebuttal Report, Dr. Netz claims that some of the relative CPT price variation over time may be due to exchange rate fluctuations. (Netz Rebuttal Report, p. 46.) However, as I explain below, there exist substantial and statistically significant changes in CRT relative prices over time even when controlling for exchange rate variation. Controlling for the shape of the CPT (curved or flat) also does not affect this conclusion.

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93. Although Dr. Netz attributes some of the changes in relative CRT prices over time to exchange rate fluctuations,¹⁰⁸ Dr. Netz does not dispute that relative prices of various categories of CRTs changed over time¹⁰⁹ and she acknowledges that CRT price changes were caused by changes in market conditions.¹¹⁰ Nonetheless, she contends that changes in relative CRT prices over time are consistent with her notion of a price structure, *i.e.*, a price structure could exist and yet relative prices between CRTs could vary over time.¹¹¹ This opinion is based on an argument that is demonstrably inconsistent with her definition of a price structure and her own acknowledgement of the factual record.

94. For example, although Dr. Netz acknowledges that competition from flat screens (*i.e.*, LCD and plasma) impacted CRT prices, and she does not contest that the impact of these alternative technologies was heterogeneous across different segments of CRTs, she maintains that relative prices in the actual and but-for worlds would be the same because flat screen competition would be present in both worlds.¹¹²

¹⁰⁸ I have extended the annualized versions of Dr. Netz's sales price hedonic analysis to control for exchange rate movements, and I continue to find that relative CRT prices typically changed across years by a statistically significant amount. Specifically, I have extended the annualized version of Dr. Netz's hedonic regression model described in my report (Willig Report, ¶ 75) to include control variables for exchange rates in addition to the product features and time trend variables employed by Dr. Netz in her hedonic analyses, as well as buyer-seller dummies. All observations are weighted by the sales quantities associated with them. Finally, I apply a data outlier filter that removed the top and bottom 2.5% of CRT prices within each size-year-application (CPT or CDT) category.

¹⁰⁹ Netz Rebuttal Report, p. 47 ("As was documented in my initial report, the cartel adjusted target prices by size and shape and there is nothing to suggest that they kept relative prices the same over time.") Since Dr. Netz also contends that actual sales prices were consistent with and affected by target prices (Netz Initial Report, p.5), she, in effect, acknowledges that relative actual prices of CRTs were not constant over time during the class period. Nevertheless, inconsistently, she specified her hedonic regressions in a fashion that held constant over time the characteristics' impacts on prices.

¹¹⁰ Netz Rebuttal Report, p. 46.

¹¹¹ Netz Rebuttal Report, pp. 46-47 ("[c]hanges in prices and changes in relative prices are consistent with the existence of a price structure.")

¹¹² Netz Rebuttal Report, p. 46 ("For example, if the cartel had not fixed prices and restricted output, CRT prices in the but-for world would have changed over time due to the emergence of flat panel displays, just as CRT prices changed in the actual world due to the emergence of flat panel displays. Any differential impact on prices of CDTs and CPTs in the actual world due to the emergence of flat panel displays would also have occurred in the but-for world. Because this differential impact in CDTs and CPTs would have occurred in both the actual and but-for worlds, it is part of the price structure.")

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95. However, since LCD and plasma competition affected CRT prices in some segments relatively more, and hence likely constrained the alleged cartel's ability to elevate prices in those segments more than in others (and Dr. Netz does not contest this possibility nor the evidence in my report that LCD and plasma had differential impacts on various segments of CRTs¹¹³), then it follows as a matter of economic logic and common sense that the kind of price structure envisioned by Dr. Netz could not exist.

96. To illustrate this with a simple numerical example, suppose that 16-inch and 29-inch CPTs would sell for \$40 and \$120, respectively, in the absence of a conspiracy. Now suppose the alleged conspirators decide to raise prices. They start with the 16-inch CPTs and decide that they can raise prices to \$44 (a 10% increase) because there is relatively little competition from other technologies. Then, with Dr. Netz's purported price structure, the conspirators would have to raise the price of the 29-inch CRT to about \$132 (the same 10% increase) to maintain the same price ratio with and without the conspiracy. However, it may not be feasible for the conspirators to raise prices of 29-inch CPTs by that much because they face relatively more intense competition from LCD and plasma displays in this size range. This is where Dr. Netz's price structure theory breaks down: she has no basis on which to claim that there would be a common percentage (or even approximately a common percentage) increase across all product categories.¹¹⁴

¹¹³ For example, Dr. Netz does not contest the evidence I present in my report describing how competition from LCD and plasma technologies affected CPTs more than CDTs and affected certain types of CPTs (mostly large and flat) more than other types of CPTs (Willig Report, ¶¶ 55-63). The differential impact is reflected in faster declines in the market penetration of CRT monitors than in the penetration of CRT TVs (Willig Report, ¶¶ 55-56). It is also reflected in the greater and earlier declines in prices of CDTs than CPTs and in prices of larger CPTs relative to small and medium CPTs (Willig Report, ¶¶ 57-61).

¹¹⁴ Dr. Netz claims that "rational cartelization" requires that if a cartel increased prices of 15-inch CDTs (for example), the cartel would also have to increase the prices of 14-inch CDTs or else customers that otherwise would have purchased a 15-inch CDT would substitute to the 14-inch CDT and avoid paying the overcharge. (Netz Rebuttal Report, p. 41.) Dr. Netz is correct that a rational cartel may not want to elevate the price of one CRT by a substantial amount while leaving unchanged the price of a very similar CRT. However, it is entirely plausible that a rational cartel that sought to elevate the price of 16-inch CPTs by 10%, for example, might target a smaller overcharge for 21-inch CPTs, an even smaller overcharge for 25-inch CPTs, and no overcharge for 29-inch or larger CPTs due to the more intense

(footnote continued ...)

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97. More generally, the undisputed fact that relative prices changed substantially over time and that changing market conditions contributed to these relative price changes is inconsistent with the existence of a price structure, as defined by Dr. Netz. Substantial changes in relative CRT prices over time clearly indicate that different segments of CRTs were affected by materially different market forces. However, once this fact is acknowledged, it should also be clear that there is no reason to assume that relative prices would be about the same in the actual and but-for worlds at any given point in time. Put differently, if different segments of CRTs were subject to different market forces, then it would be incorrect to assume with no support (as Dr. Netz does) that the alleged cartel had the incentive or ability to elevate prices for all segments of CRTs at all times by similar amounts during the class period. Certainly, Dr. Netz has failed to provide any reason to conclude that the alleged cartel had a similar impact on all segments of CRTs despite the presence of quite different market forces in various CRT segments. The bottom line is that Dr. Netz is just assuming a common percentage price elevation across myriad product dimensions, which is a baseless assumption and, in fact, makes no sense given observed pricing behavior.

98. Thus, contrary to Dr. Netz, changes over time in relative prices of CRTs are extremely relevant for assessing price structure and classwide impact, and analyses of relative price changes over time show that actual pricing data are wholly inconsistent with the type of price structure claimed by Dr. Netz. Individualized inquiries regarding the heterogeneous market forces at work in different CRT segments would be required to assess the impact of the alleged conduct on various categories of CRTs.

(... footnote continued)

competitive constraint that flat screens imposed on larger CPTs. In this example, if the overcharge on 25-inch CPTs were sufficiently small, few customers that otherwise would have purchased a 25-inch CPT would substitute to a 29-inch CPT just to avoid the (very small) overcharge. Customers that otherwise would have purchased a 16-inch CPT could avoid a more substantial overcharge by substituting from the 16-inch CPT to a 29-inch CPT, but given the substantial cost difference between 29-inch and 16-inch CPTs (\$120 compared to \$44 in this example), most customers would be unlikely to consider them to be close substitutes.

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99. In addition to the variability of relative prices across different categories of CRTs, the relative prices of CRTs also were quite different across manufacturers at the same point in time, as I explain in my report.¹¹⁵ These variations make it less likely that the alleged cartel was uniformly effective in raising prices of CRTs. Based on the putative target prices identified by Dr. Netz, the alleged cartel did not set target prices for the vast majority of every type or even category of CRT. Dr. Netz provides no explanation of how the alleged cartel members, in the face of relative prices that varied widely across manufacturers and over time, would have reached a common understanding about what price to charge for each CRT absent a complete set of explicit target prices. Absent such a common understanding or a complete set of explicit target prices, it is unlikely that the cartel would have been uniformly effective in elevating CRT prices.

A Material Amount of CRT Price Variation Is Left Unexplained by the Factors Identified in Dr. Netz's Sales Price Hedonic Regressions.

100. In her declaration, Dr. Netz claims that her “hedonic regression analysis ... allowed [her] to evaluate important features like size, application and finish in regard to CRT prices.”¹¹⁶ Dr. Netz claims in both her reports that her sales price hedonic regressions show that certain CRT product features, time trends, and customer-seller

¹¹⁵ Willig Report, ¶ 76. In her Rebuttal Report, Dr. Netz provides anecdotal evidence of a few “problematic” data points in Philips sales data used in my analysis of cross-manufacturer heterogeneity in CRT size price premiums. (Netz Rebuttal Report, p. 49.) (The same data were used by Dr. Netz in her original hedonics analysis.) She also claims that differences in “product mix” could account for some of the differences in CRT size premiums across manufacturers. (*Id.*) However, she does not claim that accounting for these issues would entirely – or even substantially – eliminate differences in CRT size price premiums across manufacturers in a given year. In fact, they do not. I have extended the hedonic analysis to (a) drop these “problematic” observations (and then apply a more general data filter described in footnote 108 to broadly remove most similar data points) and (b) to control for all product features that are key determinants of CRT prices according to Dr. Netz (*i.e.*, application, size, finish, and shape when available) and the identities of buyers and sellers. (The analysis that includes shape is confined to Samsung and Panasonic data since only these two Defendants’ data contain information on CRT shape.) I find that there are statistically significant (at the 5% significance level) differences in CRT size premiums across manufacturers within the same year, even when controlling for these key characteristics and the identities of buyers and sellers.

¹¹⁶ Netz Declaration, p. 14.

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identities explain the majority of CRT price variation.¹¹⁷ However, I explain in my report that a material amount of price variation is left unexplained by the common factors that are identified by Dr. Netz.¹¹⁸ Specifically, several “target price” documents cited by Dr. Netz indicate that Defendants considered price differentials between manufacturers of 5% or less to be enough to shift sales and shares.¹¹⁹ Thus, if it were true that Dr. Netz’s sales price hedonic regressions leave no material price variation unexplained, then the gap between the price predicted by these regressions and the actual price should rarely exceed 5%. In fact, I found the opposite: very rarely are prices predicted by Dr. Netz’s regressions within 5% of the actual prices charged for specific CDTs and CPTs.¹²⁰ I thus concluded that a material amount of CRT price variation arises from factors not included in Dr. Netz’s sales price hedonic regressions.

101. In her rebuttal report, Dr. Netz articulates several responses to my analysis, but they are without any merit.

102. First, Dr. Netz contends that whether or not a material amount of CRT price variation is left unexplained by her sales price hedonic regressions is irrelevant; what matters, according to her, is that common factors explain the majority of the CRT price variation.¹²¹ Dr. Netz cites to the high R-squared statistics in her sales price hedonic regressions (*i.e.*, the fact that observed product characteristics included in her regressions explain a substantial portion of the variation in CRT prices) as evidence that prices were determined mostly by a few observable product characteristics, identities of buyers and sellers, and time trends.¹²²

103. However, a relatively high R-squared in a sales price hedonic regression is entirely consistent with (a) individual factors having an important role in determining

¹¹⁷ Netz Initial Report, p. 70; Netz Rebuttal p. 42.

¹¹⁸ Willig Report, ¶¶ 77-79.

¹¹⁹ Willig Report, fn. 66 and ¶ 79.

¹²⁰ Willig Report, Exhibits 14A and 15A.

¹²¹ Netz Rebuttal Report, p. 50.

¹²² Netz Initial Report, pp. 69-70.

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prices, and (b) her sales price hedonic regressions being unable to reliably predict prices of individual CRTs. To illustrate the fallacy of relying on a high R-squared statistic as Dr. Netz does in this context, consider a regression that tries to predict the prices of cars and bicycles based on the number of wheels. Such a regression would likely have a very high R-squared statistic, *i.e.*, the number of wheels would predict a high proportion of the variations in the prices just because cars are priced much higher than bicycles on average. However, this regression would not reliably predict the price of an individual bicycle or car, and the high R-squared statistic would not imply that similar market forces determine prices of cars and bicycles. Similarly, Dr. Netz obtains a high R-squared statistic because CRT prices are highly correlated with CRT size (for instance), but that does not imply that her analysis is able to reliably predict the prices of individual CRTs. Other influences not captured in her model materially affect prices.

104. Second, she claims that I used an “impaired version” of her sales price hedonic regressions in my analysis when I dropped buyer-seller dummies from the regressions. However, she ignores the extensions and robustness checks that I performed and noted in my report.¹²³ Specifically, she ignores the fact that I explain that even using the fuller version of her sales price hedonic regressions with buyer-seller dummies produces a qualitatively similar result: a material amount of variation in CRT prices remains unexplained by her analysis.¹²⁴

105. Third, Dr. Netz asserts that I provided only a “weak justification” for my 5% threshold and that I have not conducted a robustness check using other (higher) thresholds.¹²⁵ Dr. Netz provides no explanation as to why she considers the justification for the 5% threshold to be “weak.” As noted in my report, several “target price”

¹²³ The backup computer programs to all the extensions and robustness checks identified in my report were produced to Plaintiffs shortly after my report was filed.

¹²⁴ Willig Report, fn. 62, fn. 65. As explained in my report, I focused on the hedonic regressions analysis without the individualized buyer-seller dummies because Dr. Netz discounts the importance of these dummies and contends that observed product characteristics alone are sufficient to reliably determine CRT price. (*Id.*) See ¶ 106 below for details on the magnitude of unexplained CRT price variation even when buyer-seller identities are included in the hedonic regressions.

¹²⁵ Netz Rebuttal Report, p. 50.

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documents cited by Dr. Netz indicate that Defendants considered price differentials between manufacturers of 5% or less to be enough to shift sales and shares.¹²⁶ Moreover, several additional target price documents cited by Dr. Netz show that when different Defendants were allegedly provided with different target prices for the same general product category in the same month, the target price differential was approximately 5% or less.¹²⁷ Thus, the 5% threshold is a proper threshold with which to assess whether or not Dr. Netz's hedonic price regressions explain a material amount of CRT price variation. While I have provided valid reasons for the 5% threshold, Dr. Netz provides no reasons at all for the higher thresholds (up to 20%) that she uses in her rebuttal report.

106. Fourth, she claims that the residual price variation can be explained by other CRT characteristics, and she also claims that exchange rate fluctuations could explain some of the residual CRT price variation left unexplained by her sales price hedonic regressions.¹²⁸ However, even including controls for all characteristics that Dr. Netz contends are the key determinants of CRT prices (*i.e.*, finish, shape and size of CRTs, time trends and identities of buyers and sellers) and also controlling for exchange rate movements leaves a material amount of CRT price variation unexplained by Dr. Netz's sales price hedonic regressions. Specifically, in all 10 years for which sufficient data are available (such that sample sizes meet the thresholds in Exhibits 10-13 in my report), the (absolute) difference between actual CPT prices and prices predicted by Dr. Netz's sales price hedonic regressions exceed 5% for more than 40% of sales.¹²⁹ For CDTs, for the seven years for which data are sufficient, the (absolute) difference between actual observed CDT prices and prices predicted by Dr. Netz's sales price hedonic regressions exceed 5% for more than 35% of sales in all but one year.¹³⁰

¹²⁶ Willig Report, fn. 66.

¹²⁷ See, *e.g.*, CHU00028768, CHU00030787, and CHU00028760.

¹²⁸ Netz Rebuttal Report, p. 48.

¹²⁹ These results are based on extending the hedonic analyses described in my report (Willig Report, ¶ 75) as described in *supra* note 108. The residuals are weighted by sales volume.

¹³⁰ Dr. Netz contends that I did not weight the data that I used by the quantity of sales associated with each observation. (Netz Rebuttal Report, p. 50.) However, as Dr. Netz's own analysis in her rebuttal

(footnote continued ...)

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107. In sum, while Dr. Netz claims to have used well-accepted principles of economics and undertaken peer-reviewed methodologies to establish the existence of a price structure in CRTs, her price structure conclusions are not supported by record evidence and reliable methodologies. In addition, as I have explained in my report, there is ample evidence that such a price structure does not exist.¹³¹ Moreover, Dr. Netz's responses related to data and regression specifications fail to rebut the conclusion that her sales price hedonic regressions leave a material amount of unexplained CRT price variation.

IV. Class-wide Impact on Indirect Purchasers Cannot Be Established using Common Evidence.

A. Dr. Netz Estimates Only Average Pass-Through Rates, and She Provides No Method for Reliably Estimating the Pass-Through Rate for a Particular Product, Finished Product Manufacturer, or Time Period.

108. In her declaration, Dr. Netz claims that she has established rather than assumed universal pass-through by retailers and manufacturers.¹³² As support for this opinion, she cites to her statistical estimates of pass-through rates by re-sellers and manufacturers,¹³³ a methodology that she contends is a common methodology that can be applied reliably to estimate the pass-through rate for all members of the proposed class.¹³⁴ She also contends that this purported common methodology demonstrates that pass-through rates by CRT finished product manufacturers and resellers were uniformly positive.¹³⁵ Further, she claims that her methodology for estimating pass-through shows that manufacturers and

(... footnote continued)

report shows (Netz Rebuttal Report, Ex. 31), weighting by sales volumes does not materially alter my findings. In all but three years between 1994 and 2007, the (absolute) difference between actual CDT prices and prices predicted by Dr. Netz's weighted sales price hedonic regressions in her own exhibit exceed 5% for more than three fifths of CRTs sold.

¹³¹ Willig Report, Section III A.

¹³² Netz Declaration, pp. 4-10.

¹³³ Netz Declaration, pp. 6-7.

¹³⁴ Netz Rebuttal Report, pp. 64-65.

¹³⁵ *Id.*

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resellers would have passed through cost increases at a one-for-one rate or even higher (*i.e.*, a pass-through rate that is no less than 100%).¹³⁶

109. The “common” methodology proposed by Dr. Netz is comprised of a regression analysis that compares the costs and prices of CRT finished products with each other, both at a point in time and over time, to estimate the pass-through rate.¹³⁷ However, Dr. Netz’s pass-through analysis is fundamentally inapposite for assessment of the proposed class because it estimates only the *average* pass-through rate for all CRT TVs or monitors at each finished product manufacturer or reseller in the distribution chain – averaged across time periods, products, and transactions. For example, data on record show that TACP manufactured and sold 785 models of CRT TVs between April 1995 and March 2006 (the period for which TACP data are available).¹³⁸ Dr. Netz has not even attempted to demonstrate that her pass-through regression analysis is capable of reliably estimating pass-through rates for different time periods and for different CRT TVs sold by TACP. Instead, she reports an *average* pass-through rate for TACP – averaged over all TACP CRT TVs and all months between April 1995 and March 2006.

110. Nowhere in her declaration or other filings in the instant matter does Dr. Netz propose any means of applying her methodology to estimate pass-through rates for individual products (or groups of products), or for specific time periods. Nor does Dr. Netz contend that she has verified that the average pass-through rates generated by her methodology accurately reflect pass-through rates for individual products (or groups of products), or for specific time periods. This is a remarkable omission considering that Dr.

¹³⁶ Netz Declaration, p. 8 (“the retailer data indicate that prices respond at least one-to-one with cost changes.”); Netz Rebuttal Report, p. 75 (“Based on these econometric studies, I conclude that any overcharges were passed through to consumers at a common rate of at least 100%.”)

¹³⁷ Netz Initial Report, pp. 115-116.

¹³⁸ CRT TVs manufactured and sold by TACP varied by size, whether or not they were combined with VCRs, and whether or not they were HDTVs. As a result of these differences that are recorded in TACP’s sales data (as well as other differences that are not recorded in TACP’s data), there is substantial variation in TACP’s CRT TV prices. Specifically, in an average month, among the biggest-selling TACP CRT TV models (those that accounted for at least 80% of unit sales in each month), the highest price was 6.8 times the lowest price. Additionally, in an average month, the 90th percentile of the sales-volume-weighted distribution of prices was 4.3 times the 10th percentile of this distribution.

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Netz acknowledges that market conditions changed over time,¹³⁹ and she does not contest my finding that different segments of CRTs were subject to different market conditions, as explained above.¹⁴⁰ Given these significant differences in market conditions across products and over time, one would expect significantly heterogeneous (and not always positive) pass-through rates. The evidence supports this view, as I explain below.

111. In her declaration, Dr. Netz states that she used transactions-level data whenever possible in order to estimate pass-through rates, and she only relied on aggregated data when using transactions-level data was not feasible.¹⁴¹ However, this merely speaks to her data handling and the granularity of the data used; it does not refute the fact that Dr. Netz estimated only average pass-through rates. Similarly, her assertion that I used monthly average price and cost data even when transactions-level data were available¹⁴² is irrelevant in this context; the relevant fact is that I calculated disaggregated pass-through rates by entity, product, and month,¹⁴³ whereas Dr. Netz did not.

112. Having provided a methodology designed only to estimate *average* pass-through rates, Dr. Netz then cites to economic theory to support her view that pass-through rates were uniformly positive and high.¹⁴⁴ Specifically, she contends that there is widespread agreement among economists that significant, permanent, and industry-wide cost changes

¹³⁹ Netz Rebuttal Report, p. 46.

¹⁴⁰ See Section III.B above.

¹⁴¹ Netz Declaration, p. 11.

¹⁴² Netz Declaration, p. 10.

¹⁴³ Willig Report, Exhibits 24 and 27.

¹⁴⁴ In her declaration, Dr. Netz also claims that “documentary and testimonial evidence” exist that support her view of at least 100% pass-through of large, permanent, and industry-wide cost changes. (Netz Declaration, p. 8.) However, she does not refer to any specific documents or testimony in her declaration. If she is referring to the documents and testimony referenced in Exhibits 29 and 30 of her initial report, then the specific quotes referenced in those two exhibits at best merely indicate that prices are linked on average to cost; they do not establish that prices always respond to cost changes. An example is found in the following quote provided by Dr. Netz: “Jean [monitor maker] has indicated that CPT [Chunghwa] has already increase [sic] 3 usd per tube to them in January and as a consequence, Jean is trying to reflect such cost to their customers.” (Netz Initial Report, Exhibit 30)

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would be passed through at a one-for-one rate in highly competitive industries.¹⁴⁵

However, Dr. Netz's view that one-for-one (or even higher) pass-through rates must have prevailed for all CRT finished products at all times and all entities in the distribution chain is inconsistent both with industry facts that she has acknowledged, and with basic economic theory.

113. First, it is important to recognize the inconsistency of Dr. Netz's view with industry facts. Dr. Netz's opinion is based on the false premise that the alleged cartel was able to elevate prices of all or most CRTs in a significant and permanent manner. However, Dr. Netz's claim of an across-the-board, significant, and permanent increase in CRT prices and a minimum pass-through rate of 100% is inconsistent with the evidence presented in Section III A of this declaration and in my report¹⁴⁶ showing that the alleged cartel was not uniformly or consistently effective (if at all) in elevating CRT prices. For example, competition from flat screen technologies would have constrained the ability of the putative cartel to elevate prices of some CRTs during certain periods,¹⁴⁷ especially since Dr. Netz does not claim that the alleged CRT cartel coordinated LCD or plasma prices in addition to CRT prices. Competition from LCD and plasma TVs and monitors also would have constrained the ability of CRT finished product manufacturers and resellers to pass-through any increases in CRT prices to end-consumers. Moreover, as I have explained above and in my report, vertically integrated firms that manufactured CRTs and also finished products had the ability and incentive to deviate from alleged cartel prices, and I have provided evidence that that the putative cartel was especially ineffective in elevating transfer prices of CRTs.¹⁴⁸ (Additionally, Dr. Netz has not analyzed whether prices were elevated for the CRTs that Sony – which is not alleged to have participated in the putative cartel – manufactured for use in its own CRT finished

¹⁴⁵ Netz Declaration, p. 5. In her deposition, Dr. Netz defines an “industry-wide” cost change to mean a change in the cost of all sellers of CRT TVs and monitors. (Netz Deposition, Vol. 2, p. 279)

¹⁴⁶ Willig Report, Section III B.

¹⁴⁷ Willig Report, ¶¶ 55-63.

¹⁴⁸ Willig Report, ¶¶ 97-100.

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products.¹⁴⁹) Thus, the evidence indicates that not all CRTs' prices were elevated significantly and permanently by the actions of the alleged cartel as Dr. Netz claims. Indeed, since Dr. Netz has not estimated but-for prices, none of her analyses is capable of establishing that the putative cartel succeeded in elevating CRT prices significantly, and Dr. Netz acknowledged in her deposition that she has not established that all putative CRT price increases by the alleged cartel were significant.¹⁵⁰ Thus, Dr. Netz has provided no sound basis to conclude that the alleged cartel was able to elevate prices in an industry-wide, significant and permanent manner, which undermines her claim of universal pass-through.

114. Dr. Netz's argument for a 100% average pass-through rate also fails because she greatly over-simplifies the relevant economic theory. Even if the markets for the manufacture and re-sale of CRT TVs and monitors were perfectly competitive, that fact alone would not be sufficient to ensure 100% pass-through rates. Standard economic theory demonstrates that pass-through rates of industry-wide cost changes in perfectly competitive markets can diverge from 100%, and depend on factors such as supply and demand elasticities.¹⁵¹ Indeed, Dr. Netz herself acknowledges that other market conditions are necessary to have a 100% pass-through rate. For example, she states in her initial report that in a perfectly competitive industry one-for-one pass-through occurs when marginal costs are constant (*i.e.*, the incremental cost of making and selling a product does not change with the volume of production and sales).¹⁵² However, she has not made any attempt to establish that this constant-cost condition is satisfied along the

¹⁴⁹ For example, Dr. Netz conceded that she had not compared Sony's CRT prices with Defendants' CRT prices. Netz Deposition Vol. 2, p. 285.

¹⁵⁰ Netz Deposition, Vol. 2, p. 326.

¹⁵¹ van Dijk, T. and F. Verboven (2008). Quantification of Damages. In Issues in Competition Law and Policy, ABA Section of Antitrust Law, pp.2331-2348; Weyl G.E. and M. Fabinger. "Pass-through as an Economic Tool." (2012), pp. 1-42.

¹⁵² Netz Initial Report, p. 77.

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long and complex CRT finished product distribution chain.¹⁵³ This failure is compounded by Dr. Netz's failure to establish that the manufacture and re-sale of CRT TVs and monitors approximates the textbook standard of a perfectly competitive industry at every level of the distribution chain, especially since Dr. Netz acknowledges that in an imperfectly competitive market, in which sellers have a degree of market power, pass-through rates can be less than 100%.¹⁵⁴

115. A finding that pass-through rates are zero or even negative for some finished products at certain periods of time is entirely consistent with economic logic and theory.¹⁵⁵ First, if, as is likely, the alleged cartel was able to elevate the prices of only some CRTs or only in a transitory manner, or the increase was not significant, then by Dr. Netz's own admission, pass-through rates could have been zero.¹⁵⁶ As I have demonstrated, there are ample reasons to conclude that the alleged cartel was not universally effective in elevating all CRT prices.

116. Second, even if the alleged cartel were able to elevate prices of all CRTs in a permanent and significant manner, economic theory shows that not all finished product prices would have necessarily been elevated and prices of some may have even fallen. For example, suppose (contrary to evidence) that vertically integrated firms as well as un-integrated firms closely adhered to target CRT prices set by the alleged cartel, and consequently prices of all CRTs were significantly and permanently elevated. In this scenario, finished product manufacturers that sourced most of their CRTs from third-party CRT suppliers would face an increase in cost, and they would likely have increased the prices they charged for their TVs and monitors. However, vertically integrated CRT

¹⁵³ As described in my report, the chain for manufacturing and distributing CRT TVs and monitors had up to 5 stages and included many different types of entities with heterogeneous business models (Willig Report, ¶¶ 32, 120 and Exhibit 23).

¹⁵⁴ Netz Initial Report, pp. 75-76.

¹⁵⁵ Economists have found empirical evidence of negative pass-through rates. See, e.g., Michael M. Knetter, "International Comparisons of Pricing-to-Market Behavior," *The American Economic Review*, Volume 83, No. 3 (Jun., 1993), pp. 473-486.

¹⁵⁶ Netz Deposition Vol. 2, pp. 273-4, 323, 325.

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finished product manufacturers that self-supplied most of their CRTs may not have elevated their CRT TV and monitor prices and even may have reduced those prices despite the elevation in CRT prices. Economic theory shows that the response of vertically integrated firms in this setting depends on technical economic conditions related to the nature of competition among CRT finished product manufacturers.¹⁵⁷ In particular, if firms' price strategies are such that prices are strategic substitutes rather than strategic complements, then vertically integrated manufacturers may actually have reduced prices of their finished products in response to increases in prices of rival manufacturers that procured CRTs primarily from unaffiliated CRT vendors. Whether firms' conduct can be characterized as strategic complements or substitutes depends on a variety of market characteristics, and Dr. Netz has performed no analysis as to whether these conditions are met in the CRT finished products marketplace.

117. The evidence indicates that pass-through rates were often not positive. In my report, I examine the distribution of pass-through rates for the entities analyzed by Dr. Netz in her initial report, and I find that each of them responded to cost shocks in widely divergent ways, depending on the time period and product.¹⁵⁸ Moreover, for some entities, the pass-through rates were not positive in a significant number of instances. This heterogeneity in pass-through rates is masked by Dr. Netz's estimates of average pass-through rates.

118. For example, I examined 757 significant changes in the cost to PC Connection (an online retailer) of procuring and selling CRT monitors, and calculated the extent to which these cost changes were passed-through by PC Connection in its retail prices.¹⁵⁹ I found

¹⁵⁷ See, e.g., Bulow, J. I., J. D. Geanakoplos, and P. D. Klemperer. "Multimarket Oligopoly: Strategic Substitutes and Complements." *Journal of Political Economy*, Vol. 93, No. 3. (1985) ("Multimarket Oligopoly: Strategic Substitutes and Complements"), pp. 488-511. An increase in the transfer price of CRTs sold within a vertically integrated finished product manufacturer need not represent an actual cost increase since it is a transfer between integrated entities, which makes it all the more likely that an integrated firm would not necessarily increase finished product prices in response to an elevation in CRT transfer prices.

¹⁵⁸ Willig Report, ¶¶ 123-124 and Exhibit 24.

¹⁵⁹ Willig Report, Exhibit 24.

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that in 20% of these instances, PC Connection did not pass-through cost changes, *i.e.*, the pass-through rate was zero or negative. In contrast, Dr. Netz estimates an average pass-through rate of 109% for PC Connection monitors. Other resellers and manufacturers also had a high incidence of zero or negative pass-through rates, as explained in my report.

119. The incidence of zero or negative pass-through rates is inconsistent with Dr. Netz's view that CRT TV and monitor manufacturers and resellers uniformly passed-through cost changes, and did so at a high rate. The price-cost pass-through analysis presented in Exhibit 24 of my report is based on significant, non-transitory cost changes that were very likely to affect more than one reseller/manufacturer (contrary to Dr. Netz's claim that these cost changes were small, transitory, and idiosyncratic¹⁶⁰). The cost change events examined in my analysis in Exhibit 24 of my report were typically large ones, *i.e.*, the mean monthly cost change associated with these events was among the largest 10% of monthly cost changes at the relevant reseller/manufacturer.¹⁶¹ Not only were the examined cost changes large, they were also non-transitory. Specifically, I analyzed only those cost changes that persisted for at least a quarter.¹⁶²

¹⁶⁰ Netz Rebuttal Report, p. 63.

¹⁶¹ This conclusion is based on analyzing cost data produced by the entities analyzed in Exhibit 24 of my report. Thus, for example, Amazon monitor cost data are used to identify 88 major cost change events. For each event, a percentage monthly absolute cost change for the relevant monitor in the relevant month is calculated and compared with the distribution of monthly absolute monitor cost changes at Amazon for all monitors and months. On average (mean and median), the percentage monthly absolute cost change associated with major cost change events at Amazon falls into the top decile of the distribution of monthly (absolute) monitor cost changes at Amazon for all monitors and months. This is true for all entities analyzed in Exhibit 24.

¹⁶² The baseline analysis I presented in my report focused on large cost changes that persisted (*i.e.*, they were not reversed) for at least two months. I have extended the analysis to include cost changes that persisted for at least a quarter and find very similar results, *i.e.*, many retailers had a high incidence of zero or negative pass-through rates. Specifically, using the one-quarter window, I find that 7 of 12 entity-category (TV or monitor) pairs listed in Exhibit 24 of my report with a sample size of 25 or more had a zero or negative pass-through incidence of at least 10%. (Importantly, sales data on record indicate that resellers frequently changed prices of CRT TVs and monitors. Specifically, the average reseller in the data used in my analysis changed the price of the average CRT finished product six times a year. Given this frequency, it is likely that resellers would have considered altering price in response to a large cost change that lasted for at least a quarter.)

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120. To further analyze the pass-through rates of widespread cost changes, I have identified quarters in which most retailers on record experienced significant and lasting changes in the costs of a large fraction of the CRT monitors they sold, and then calculated the incidence of zero or negative pass-through rates. I find that even during such instances of widespread, significant, and lasting cost changes, there was a high incidence of zero or negative pass-through rates.

121. For example, available data show that retailers experienced a broad reduction in their CRT monitor costs in Q3 2001. Specifically, 87.6% of CRT monitors sold in Q3 2001 was accounted for by monitor models whose average costs were lower in Q3 2001 than in Q2 2001.¹⁶³ The median cost change per CRT monitor was -2.5% in Q3 2001, which is substantially higher than the median quarterly monitor cost change of -0.013% for all CRT monitors in all quarters.¹⁶⁴ Not only was this cost reduction significant and widespread, it was also not transitory, in that the costs of most CRT monitors decreased again in the following quarter.¹⁶⁵ Even in this context, the data record shows a very high incidence of zero or negative pass-through rates. Specifically, across all CRT monitors whose costs decreased by at least 2.5% in Q3 2001, 32.4% of sales was accounted for by models whose prices did not decrease during that quarter.¹⁶⁶

¹⁶³ The analysis is based on all retailers with CRT monitor sales and cost data in Q2 2001 and Q3 2001: Circuit City, Costco, Fry's, PC Mall, PC Connection, Sears, and Zones. All these retailers, other than Sears, experienced substantial monitor cost reductions in Q3 2001.

¹⁶⁴ Costs increased substantially for only a few CRT monitors in that quarter: 0.3% of CRT monitor sales volume in Q3 2001 was accounted for by models whose average quarterly procurement costs were at least 1% higher in Q3 2001 than in Q2 2001.

¹⁶⁵ 80.3% of CRT monitor sales in Q4 2001 was accounted for by monitors whose costs declined that quarter.

¹⁶⁶ Although the available data show that retailers' costs declined for a significant majority of CRT monitors procured in Q3, 2001, CRT monitor acquisition costs did not decline for *all* retailers and models. However, that does not necessarily depress pass-through rates. Contrary to Dr. Netz's claim that resellers pass-through cost changes at a higher rate when most other resellers are also experiencing similar cost changes (Netz Rebuttal Report, p. 63), economic theory does not predict that the pass-through rates of industry-wide cost changes are necessarily higher than the pass-through rates of firm-specific cost changes. Pass-through rates can be higher for industry-wide or firm-specific cost changes depending on technical economic conditions related to the nature of competition among CRT finished product re-sellers and among CRT finished product manufacturers. In particular, if firms' prices are strategic substitutes

(footnote continued ...)

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122. Dr. Netz critiques several aspects of my analysis (Exhibit 24 in my report) that show that re-sellers and manufacturers often did not pass-through cost changes, thus contradicting Dr. Netz's claim of universal pass-through. For example, Dr. Netz mistakenly claims that my estimates of pass-through rates following major cost events may be confounded by delayed pass-through of cost changes. As an example, she posits that a cost change in late February might not have been passed-through to prices until March.¹⁶⁷ She appears to believe that my analysis would not reflect the March price adjustment, and hence would understate the degree of pass-through. However, as I explained in my report, when I allowed for lags in price adjustments such that a price change in March by a retailer in response to a cost change in February would be reflected in observed actual pass-through, the results were not qualitatively different from those reported in Exhibit 24.¹⁶⁸ As such, the hypothetical example that Dr. Netz describes would not lead to an under-estimate of pass-through rates.¹⁶⁹ Dr. Netz also questions how I determine "major cost change events" in my analysis in Exhibit 24 of my report, but even if a major cost change event were defined as large cost changes from one month to the next rather than changes relative to the average lifetime cost of a product, the results reported in Exhibit 24 would not be qualitatively different.^{170,171}

(... footnote continued)

rather than strategic complements, the pass-through rate for industry-wide cost changes need not be higher than for firm-specific cost changes. Whether firms' conduct can be characterized as strategic complements or substitutes depends on a variety of market characteristics. (See Multimarket Oligopoly: Strategic Substitutes and Complements.) In any event, the high incidence of zero or negative pass-through rates in Q3 2001 indicates that even for broad cost changes that affect most products and resellers, pass-through need not be uniformly positive.

¹⁶⁷ Netz Rebuttal Report, pp. 89-90.

¹⁶⁸ Willig Report, fn. 119.

¹⁶⁹ More generally, I have extended the analysis in Exhibit 24 of my report to include up to a 2-month delay in price adjustments, and I continue to find that many re-sellers continue had a high incidence of zero or negative pass-through rates. See *supra* note 162 for details.

¹⁷⁰ In particular, I would still find that many resellers had a high incidence of zero or negative pass-through rates. For example, 35% of cost change events at Zones were associated with zero or negative pass-through rates when cost change events are defined as month-to-month cost changes that are 5% or larger (compared to 30% when "cost change events" are defined as in the analysis presented in Exhibit 24). Of the 11 entities in Exhibit 24 of my report with at least 50 cost change events, 8 had zero or

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123. In sum, Dr. Netz’s “common” methodology amounts to estimating only average pass-through rates, and it masks substantial variation in pass-through rates across products and over time. Dr. Netz provides no method for reliably estimating the pass-through rate for a particular product, finished product manufacturer or reseller, or time period.

B. Dr. Netz’s Methodology for Estimating Pass-Through Is Unreliable because It Does Not Control for Changes in Market Conditions and Does Not Properly Control for Differences across Products.

Dr. Netz Makes No Effort to Control for Changes in Market Conditions during the Class Period, thereby Rendering Her Average Pass-Through Estimates Unreliable.

124. As I explain in my report, CRT TV and monitor prices typically declined during the class period, and some of this decline was likely caused by reductions in manufacturing costs of CRT TVs and monitors. However, it is very likely that some of the decline in retail prices of CRT finished products was also caused by changes in consumer preferences in favor of newly emergent LCD and plasma technologies, whose prices dropped considerably and whose quality improved during the class period.¹⁷² A proper estimate of pass-through rates would separate these two sources of pricing pressure (*i.e.*, cost reduction and demand reduction) on CRT TVs and monitors. Conflating and aggregating the two would exaggerate pass-through rates and attribute the entire decrease in prices of CRT finished products to the decline in costs when, in fact,

(... footnote continued)

negative pass-through rates in at least 10% of those events when cost change events are defined as month-to-month cost changes that are 5% or larger.

¹⁷¹ Of Dr. Netz’s 7 additional datasets used in her rebuttal report, 2 have more than 50 cost change events (specifically, Sears TVs and Best Buy TVs). The share (volume weighted) of large cost changes with an observed pass-through rate of zero or less is 23% for Sears and 24% for Best Buy. (When “major cost changes” are defined as month-to-month (absolute) cost changes that are 5% or larger, both entities have zero or negative pass-through rates in at least 10% of those events (where each event is quantity weighted).)

¹⁷² Willig Report, ¶¶ 131-132. Additionally, the decline in retail demand for CRT TVs and monitors likely would have exerted pressure on upstream suppliers to reduce the wholesale prices they charged for CRTs and CRT finished products. See, *e.g.*, the testimony of representatives of various Panasonic entities cited in Willig Report, fn.130.

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the decrease in prices was at least partly due to changes in consumer preferences and to LCD and plasma competition.

125. In her initial report, Dr. Netz acknowledges that market conditions (such as the relative quality of products) changed over the course of the class period, and that it is necessary to address these changes in order to properly estimate pass-through rates: “[W]hen observing changes in prices and costs over time, not only is the cost changing, but other factors are changing too, such as the quality of the product relative to other available products”¹⁷³ and “[i]f one uses time-series data, one can include variables to control for changes that take place over time.”¹⁷⁴ Nevertheless, as noted in my report, Dr. Netz fails in her pass-through analyses to control for changes in market demand for CRT finished products that occurred during the class period.¹⁷⁵ Dr. Netz does not contest or even address this critique of potential bias in her declaration or her rebuttal report, and her pass-through analyses continue to suffer from this critical flaw. In her deposition, Dr. Netz acknowledged that she did not control for increasing LCD and plasma competition in her pass-through analyses.¹⁷⁶

126. Given the enormous changes in market conditions during the 1995-2007 class period, Dr. Netz’s failure to control for changes in market conditions is a serious omission that potentially inflates her estimates of average pass-through rates. As explained in my report,¹⁷⁷ making just one change to Dr. Netz’s pass-through method, *i.e.*, including a control for time trends (in a manner that is standard in empirical economics to control for market changes, and is very similar to the one that Dr. Netz herself uses in her hedonic regressions), leads to very different results from hers. Specifically, after controlling for market trends, about a third of the estimated average

¹⁷³ Netz Initial Report, p. 116.

¹⁷⁴ *Id.*

¹⁷⁵ As noted in my report, the only exception is in Dr. Netz’s pass-through regression for Tatung, a monitor manufacturer, but Dr. Netz does not explain in either of her reports why her model specifications for Tatung differ from those for the other entities that she examines. Willig Report, fn. 132.

¹⁷⁶ Netz Deposition, Vol. 2, pp. 382-383.

¹⁷⁷ Willig Report, fn. 134.

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pass-through rate estimates for entities Dr. Netz analyzed in her initial report are less than 80% and statistically significantly different from 100%. This finding contrasts starkly with Dr. Netz's claim that all of these entities had average pass-through rates of at least a 100%.¹⁷⁸ Moreover, after controlling for market trends, the estimated average pass-through rate for the only major monitor manufacturer in the data used in her initial report, TAIS, is so small (16%) that I cannot reject the possibility that it is zero.^{179, 180} Thus, Dr. Netz's average pass-through rate estimates are not robust against a key extension that she herself acknowledges is necessary. As such, her average pass-through rate estimates are likely inflated and provide an unreliable basis for assessing the existence and extent of impact on indirect purchasers, even on average.

127. Although Dr. Netz fails to control for changes in market conditions when estimating average pass-through rates, despite stating that such controls are necessary, she does raise several concerns about the manner in which I control for market trends.¹⁸¹ I have reviewed each of her criticisms and found them all to be without merit, as explained in the remainder of this section.

128. First, Dr. Netz contends that the time trend variable in my pass-through regressions may not control for general market-wide trends because it is simultaneously attempting to control for "general marketplace trends" and "individual product cycles."¹⁸² She appears to believe that the trend variable "captures how long a product has been sold

¹⁷⁸ When I estimate the pass-through rates for the additional 7 datasets in Dr. Netz's RR-34 (excluding bestbuy.com but using the new Best Buy data from Dr. Netz) using product fixed effects and adjusted time trends, I find that 3 of the entities have pass-through rates that are less than 0.8 and statistically significantly different from 100%.

¹⁷⁹ This conclusion is based on a statistical test at the 10% significance level.

¹⁸⁰ When I estimate the pass-through rates for the additional 7 datasets in Dr. Netz's RR-34 (excluding bestbuy.com but using the new Best Buy data relied on by Dr. Netz) using product fixed effects and adjusted time trends, I find that 2 of the estimated pass-through rates (Sears TVs and RadioShack TVs) are not statistically significantly different from zero.

¹⁸¹ Netz Rebuttal Report, pp. 80-81.

¹⁸² Netz Rebuttal Report, p. 80.

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by each firm.”¹⁸³ Thus, she interprets the trend variable as an imperfect metric of how long a product has been on the market (the product’s “age”). She then proceeds to criticize this variable for its imperfections in measuring a product’s age, and for attempting to function doubly as a control for a product’s age and as a control for market trends.

129. Dr. Netz is mistaken in her incorrect assumption that the trend variable I rely on is a product-specific age metric. It is not. Instead, it is a metric that captures overall market trends (which includes the tendency for CRT finished products’ prices to decrease over time). This should have been evident from the plain fact that the trend variable takes on the same value (before scaling for the lifetime average price of a product) for all products in a given month. For example, if product A had been sold by a retailer for 6 months, and product B for 12 months as of June 2000, and they happen to have the same lifetime average price, then the two products would have identical time trend values. Thus, my metric of time trends is not a measure of a product’s age, and it appropriately captures market trends.

130. Dr. Netz’s second critique is that my market trend variable is “linear,” which amounts to an assumption that prices fall over time at a linear rate.¹⁸⁴ However, as I described in my report, I have conducted multiple robustness tests that control for market trends in various ways, including standard non-linear methods of controlling for changes in relevant conditions over time, such as the use of quarter fixed effects and a scaled log of time trend.¹⁸⁵ Dr. Netz just ignores these extensions in her declaration and rebuttal report.

131. Third, Dr. Netz claims that I mistakenly treat identical products differently. As evidence, she refers to two 17-inch eMachines monitors sold by Circuit City: eView17f2 (sold from May 2003 through September 2005) and eView17f3 (sold from March 2004

¹⁸³ *Id.*

¹⁸⁴ Netz Rebuttal Report, p. 81.

¹⁸⁵ Willig Report, ¶ 173(e).

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through December 2007). Based on information on product features gathered from on-line sources, she concludes that these two are “identical in all respects.”¹⁸⁶ If indeed they were identical products, then they should have been priced identically. However, Circuit City’s sales data reveal that during the 18 months that both models were sold by Circuit City, the eView17f3 model was consistently priced above the eView17f2 and the difference between their monthly average prices was as high as 210%.¹⁸⁷ Clearly, there were economically meaningful differences between these two monitors, and it is appropriate to treat them differently, as I do in my analysis.

132. Fourth, Dr. Netz contends that including a time trend variable in my pass-through regressions reduces the precision of the estimated average pass-through rates because the time trend variable is correlated with CRT cost trends.¹⁸⁸ This objection ignores the manifest benefit of including such a control, *i.e.*, the ability to produce reliable (unbiased) estimates of average pass-through rates. By not controlling for market trends, Dr. Netz’s approach produces average pass-through estimates that are likely biased upwards, *i.e.*, she over-estimates average pass-through rates. Moreover, contrary to Dr. Netz’s assertion, my estimates of average pass-through rates are extremely precise. If the problem alleged by Dr. Netz were material, I would expect that my approach would often be unable to reject the possibility that the average pass-through rate is zero (*i.e.*, the confidence intervals associated with pass-through rates would be so wide that they would include zero). This is not the case, as evidenced by the fact that 30 of the 35 average pass-through estimates listed in Exhibit 25 of my report are significantly different from zero at the 0.1% significance level, and all but two of the remaining estimates are significant at the 1% or 5% levels (which are standard in econometric analyses).¹⁸⁹ Moreover, 11 out of 35 average pass-through estimates are below 80%, and different from 100% at a 5% significance level.

¹⁸⁶ Netz Rebuttal Report, p.80.

¹⁸⁷ These price comparisons are based on Circuit City data.

¹⁸⁸ Netz Rebuttal Report, p. 81.

¹⁸⁹ Ramanathan, R. (1995). *Introductory Econometrics with Applications*, Third Edition, Harcourt Brace College Publishers (“Introductory Econometrics with Applications”), p. 50.

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133. Finally, Dr. Netz objects to my scaling the time trend variable by the average lifetime price of the product, on the grounds that the prices of less expensive but innovative products may decline (measured in dollars per month) more than the prices of relatively more expensive products.¹⁹⁰ However, she provides no empirical evidence to support this hypothesized shortcoming. Moreover, the retailer sales data used in my pass-through analyses show that prices of more expensive CRT finished products typically declined more (in dollars) each month than prices of less expensive products.¹⁹¹ Additionally, as noted in my report, I have carried out multiple robustness tests that control for market trends in various ways, and the results of these extensions are qualitatively similar to the results from my baseline model.¹⁹²

Dr. Netz's Method for Estimating Pass-Through Fails to Control Appropriately for Differences in Products.

134. As I explained in my report, Dr. Netz does not properly control for differences across products in her pass-through analyses.¹⁹³ Dr. Netz's estimation of average pass-through rates relies in large part on comparing the prices and costs of different CRT finished products. For example, Dr. Netz's analysis of Amazon's pass-through rate for monitors includes two 19-inch monitors with the CTX brand, both of which had a resolution of 1600 x 1200, and which I refer to as CTX Expensive and CTX Cheap for

¹⁹⁰ Netz Rebuttal Report, p. 81.

¹⁹¹ This conclusion is based on a regression in which the dependent variable is the average absolute month-to-month change in the price of a product. The independent variables are: the mean lifetime price of the same product, indicator variables for each re-seller/manufacturer, and interactions between re-seller/manufacture and the mean lifetime price of the product. (An observation is defined by a product-retailer pair. Separate regressions for CRT TVs and monitors were estimated. Robust standard errors and analytical weights were employed. Gateway and Sanyo were omitted from the analysis because their data do not contain sales quantities.) The sum of the coefficient on the mean lifetime price and the coefficients on the interaction terms is positive for all retailers, except for Walmart, for which it is not significantly different from zero at a 5% significance level. The model rejects the proposition that this sum equals zero at the 5% significance level for 13 out of 15 estimates for the CRT monitor re-sellers in Exhibit 25 of my report. Similarly, the model rejects the proposition that this sum equals zero at the 5% significance level for 9 out of 13 estimates for the CRT TV re-sellers in Exhibit 25 of my report.

¹⁹² Willig Report, ¶173.

¹⁹³ Willig Report, ¶¶ 128-130.

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convenience.¹⁹⁴ In February 2003, Amazon paid an average of \$278 for CTX Expensive and sold it to a particular customer for \$294. In the same month, it paid an average of \$159 for CTX Cheap and sold it for an average of \$167. The logic of Dr. Netz's pass-through regression is such that she would compare CTX Expensive and CTX Cheap and note that (a) CTX Expensive cost Amazon \$119 more than CTX Cheap, and (b) Amazon sold CTX Expensive for \$127 more than the price of CTX Cheap. Based on this, Dr. Netz's approach would estimate a pass-through rate of roughly 107% for these products (\$127 divided by \$119).

135. However, the fact that Amazon charged higher prices for monitors that cost them more to procure and sell says nothing about how it would have responded to the alleged overcharge on a particular product. As I explained in my report, Dr. Netz's approach potentially over-estimates average pass-through rates because she attributes the entire difference in the retail prices of the two CTX monitors in this example to the difference in their costs.¹⁹⁵ However, it may be that the CTX Expensive monitor was priced higher in part because it had features (*e.g.*, differences in dot pitch, maximum resolution, video input bandwidth) for which customers were willing to pay more.¹⁹⁶ As a result, the price differential for these two models may result from differences in customers' willingness to pay for each model, not just differences in Amazon's procurement and selling cost. In such cases, Dr. Netz's regression analysis would over-estimate average pass-through rates because it assumes that all price differences between products that share a few characteristics are entirely attributable to the products' cost differences.

136. In her initial report, Dr. Netz acknowledges that it is important to control for differences in characteristics across CRT finished-product models.¹⁹⁷ In her rebuttal

¹⁹⁴ This example is discussed in Willig Report, ¶¶ 128-130.

¹⁹⁵ *Id.*

¹⁹⁶ No information on these features is available in the sales data produced by Amazon in the instant litigation.

¹⁹⁷ Netz Initial Report, p. 116 (“...when observing multiple products or a product sold at multiple outlets at a single point in time, there may be differences across products and/or across outlets that may have an impact on price as well as on cost.”)

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report, she claims that she has controlled for all product features that are “economically meaningful.”¹⁹⁸ This claim is clearly contradicted by the CTX example noted above and explained in my report (and Dr. Netz did not respond to the CTX example in her rebuttal report). Dr. Netz’s approach makes no distinction between the two CTX monitors and considers them to have no economically meaningful differences despite the fact that one CTX monitor was priced 76% higher than the other in the same month. In failing to make a distinction between them, her pass-through estimate attributes the entire 76% difference in their prices to the difference in their costs – even if Amazon’s actual response to a change in the cost of either monitor would be zero.

137. To further illustrate the absurdity of her claim that her analysis controls for all product features that are “economically meaningful,” consider the fact that Dr. Netz has no data on the shape (flat or curved) of CRT monitors sold by Amazon, and thus she does not control for shape in her pass-through regression for Amazon CRT monitor sales. Dr. Netz clearly believes that CRT monitor shape is an “economically meaningful” feature. She describes shape as a “major price differentiator” for CRTs.¹⁹⁹ She also attempts to control for CRT monitor shape in her pass-through regressions when information on that feature is available,²⁰⁰ and she finds that monitor shape is a statistically significant influence on monitor prices in nearly all of her CRT monitor pass-through regressions in which she controls for shape.²⁰¹ As a result, even based on Dr. Netz’s own statements and analyses, it is clear that she does not control for all of the “economically meaningful” product features in her pass-through analysis of CRT monitor sales by Amazon (and seven other monitor pass-through analyses where she has no data on monitor shape). More generally, Dr. Netz does not have consistent data on product features across

¹⁹⁸ Netz Rebuttal Report, p. 76 (“The fundamental difference between his approach and mine is that I control for those product differences that are economically meaningful, whereas Prof. Willig controls for any and all differences between two products, regardless of whether or not those criteria are likely to have an impact on price.”)

¹⁹⁹ Netz Rebuttal Report, p. 12.

²⁰⁰ Netz Rebuttal Report, Exhibit RR-35.

²⁰¹ The coefficient estimates are statistically significant at the 1% level in 10 of 12 monitor cost pass-through regressions estimated by Dr. Netz with shape as a control variable.

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resellers and manufacturers, and hence she relies on incomplete data on product features. These gaps make Dr. Netz's estimates of average pass-through rates unreliable.

138. In my report, I implemented a standard solution – product fixed effects – for addressing the problem of incomplete information on product features that fully controls for differences between products.²⁰² Economists have known for a long time that this type of data limitation can lead to biased and unreliable estimates, and have also long recognized that the use of fixed effects estimation can alleviate this problem.²⁰³

139. Dr. Netz objects to this approach on the grounds that I have treated identical products as if they were separate and distinct, thus making distinctions between products based on features that may not have any economic meaning.²⁰⁴ She provides anecdotal support for this claim by citing to several CRT finished products that she concludes are identical (based on her review of their product features as described on various web sites). For instance, she contends that there is no economically meaningful difference between two models of 15-inch Sony monitors identified as “HMDA 100” and “HMDA 100L” that Circuit City sold during the 2000-2002 period. My approach does indeed consider these to be separate products, but this is entirely appropriate because Circuit City sales data reveal that during the 22 months that both models were sold by Circuit City, the HMDA100L was usually priced above the HMDA100, and the difference in their monthly average prices was as high as 205%. Clearly, there were economically meaningful differences between these two models. The same conclusion applies to the other anecdotal examples of putatively identical products that Dr. Netz provides.²⁰⁵

²⁰² Willig Report, fn. 133, fn. 141, ¶ 163d, ¶ 174d.

²⁰³ An early reference to the potential for incomplete information on control variables to introduce biased estimates and the use of fixed effects as a solution can be found in Mundlak, Y. “Empirical Production Function Free of Management Bias.” *Journal of Farm Economics*, Vol. 43, No. 1 (Feb., 1961), pp. 44-56. A later discussion can be found in Wooldridge, J. (2002). *Econometric Analysis of Cross Section and Panel Data*, The MIT Press, pp. 247-251.

²⁰⁴ Netz Rebuttal Report, pp. 77-78.

²⁰⁵ For instance, Dr. Netz claims that her web research shows that two Broksonic televisions (the CTSGT-2799C and CTSGT-2799T) sold by Circuit City were identical 9” TVs with a built-in VCR. (Netz Rebuttal Report, p.77) However, Circuit City sales data reveal that during the 10 months that both

(footnote continued ...)

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140. More generally, even if my approach were to treat two products that were identical in every way as separate and distinct products, this would not introduce any bias into the estimated product fixed effects or the estimated average pass-through rate.

141. Additionally, statistical evidence shows that my method better controls for product differences than Dr. Netz's method. In particular, my method explains substantially more of the variability in CRT finished product prices.²⁰⁶ Moreover, the increase in explanatory power is highly statistically significant, which is inconsistent with and refutes Dr. Netz's claim that the features she fails to control for are not economically important.

142. Finally, Dr. Netz claims that my methodology is suspect because it produces implausible estimates of pass-through rates.²⁰⁷ For example, she claims that my method produces different pass-through rates for products that she considers to be nearly identical (based on information provided in various web sites about the products' features). She refers to two examples: the ViewSonic P75+ and P75+B sold by Amazon, which she considers to be identical in all respects except for their color; and two versions of the NEC FE992, also sold by Amazon, which she also claims are identical except for their color.²⁰⁸ However, Amazon data show that, on days when Amazon recorded sales of both

(... footnote continued)

models were sold by Circuit City, the CTS GT-2799C was consistently priced higher than CTS GT-2799T, and the difference in their monthly average prices was as high as 53%.

²⁰⁶ Specifically, my staff, under my supervision, estimated Dr. Netz's regression model with one modification: product fixed effects were added to her model. (Where there was perfect collinearity between Dr. Netz's product characteristics and certain product fixed effects, the relevant product fixed effects were dropped.) If the product fixed effects explain economically significant product features beyond those explained by Dr. Netz's variables, then model fit should improve substantially as a result of this modification. The model fit does substantially improve, as evidenced by an average 39% decrease in the Residual Sum of Squares (a measure of unexplained variation) in CRT finished product prices. (The average is across all entity-product category pairs for which Dr. Netz estimates pass-through in her Rebuttal Report Exhibit RR-34.) This decline is significant as evidenced by the fact that an F-test of the joint significance of the additional product fixed effects finds them to be jointly significantly different from zero at the 1% level in all 41 estimates provided by Dr. Netz. Moreover, on average, across the 41 specifications, 87% of the individual product fixed effects were significant at the 5% level.

²⁰⁷ Netz Rebuttal Report, p. 79.

²⁰⁸ *Id.*

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versions of NEC FE992, their prices were not always equal and the difference was as much as 17%, which contradicts Dr. Netz's view that these were identical products. As for the ViewSonic P75+ and P75+B, Amazon data do indicate that they had nearly identical prices, and indeed their estimated pass-through rates (41% and 74%, respectively) were not statistically significantly different at the 5% level.

143. In my report, I noted that there were substantial differences in the estimated pass-through rates associated with several CRT monitors sold by Amazon (as well as other retailers), and I concluded that some of the heterogeneity in estimated pass-through rates for the various CRT finished products of a given retailer or manufacturer likely stems from differences in market conditions across different CRT finished product categories, and from time-varying practices (such as retailers using certain models of finished products as loss leaders).²⁰⁹ The heterogeneity may also be due to limitations in available data (*e.g.*, lack of information about the rebates paid or received by a retailer). Whichever is the case, pass-through rates cannot be reliably estimated using a regression-based formulaic approach that pools together all products and time periods, and further disaggregation is likely necessary. Individualized inquiries would be required to determine whether a particular purchase on a particular day from a particular retailer was impacted by the alleged cartel.

144. In her rebuttal report, Dr. Netz applies my approach to *all* CRT monitors sold by Amazon during the relevant period and finds that the estimated product-level pass-through rates are frequently implausible, which she claims undermines my methodology.²¹⁰ As an initial matter, I limited my analysis to Amazon's top-selling CRT monitors sold by Amazon in order to ensure a sufficient sample size for each monitor since having a relatively large sample size for each monitor is more likely to provide reliable pass-through estimates. Thus, I limited the analysis presented in Exhibit 27 of my report to the 36 of Amazon's 50 top-selling CRT monitors (in terms of units sold) that it sold for at least 18 months. The resulting estimated pass-through rates ranged from close

²⁰⁹ Willig Report, ¶¶ 122, 136-137 and Exhibit 27.

²¹⁰ Netz Rebuttal Report, p.78

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to zero to a little over 150%, with just one product having an outlier pass-through rate estimate of 265%.²¹¹ Dr. Netz only obtains more extreme pass-through rates because she extends the analysis to all CRT monitors, including those that were sold in small quantities and for just two or three months. It is well known among economists that parameter estimates based on small samples are more likely to be less precise.²¹²

145. In fact, Dr. Netz's own approach to estimating pass-through rates – when applied to disaggregated data sets and specific product categories – generates extreme and implausible pass-through rates. For example, I have applied Dr. Netz's model to the data that she uses in her top-and-bottom pass-through analysis to estimate pass-through rates for products with various product features that she deems are important drivers of TV prices.²¹³ This analysis produces estimated pass-through rates for specific product categories based on Dr. Netz's model. In her top-and-bottom analysis, she estimates a single average pass-through rate of 124% for all CRT TVs.²¹⁴ However, when Dr. Netz's approach is used to estimate separate pass-through rates for each product category (where each category is defined by a combination of product features that she controls for in her top-and-bottom analysis), the estimated pass-through rates vary widely and implausibly across categories. For example, the estimated pass-through rate for 26-inch HDTV flat-screen TVs manufactured by Samsung is 1,285%. More generally, her approach generates pass-through rate estimates of less than -800% for 23 TV categories and more

²¹¹ The differences between the product-level pass-through rates for the 36 Amazon monitor products examined in Exhibit 27 of my report are statistically significant at the 1% significance level. (This conclusion is based on an F-test of the restriction that all the product-level coefficients are equal.)

²¹² See, *e.g.*, Introductory Econometrics with Applications Chapter 3.4.

²¹³ I used Dr. Netz's top-and-bottom data to run a regression of price on cost, controlling for the same product characteristics she used in Exhibit 34 of her Initial Report and Rebuttal Report (brand, size, flat screen, and HDTV indicators). However, I interacted these product characteristics with the cost variable, allowing the estimated pass-through coefficients to vary by these same characteristics. I then calculated the implied pass-through rate for each combination of characteristics in the data by summing the relevant regression coefficients.

²¹⁴ Netz Rebuttal Report, Exhibit RR-34.

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than 500% for 17 TV categories.²¹⁵ Some of this variation may well be due to differences in pass-through rates in various categories of finished products. However, some of the more implausible pass-through rates are likely due to small sample sizes.²¹⁶

146. Thus, Dr. Netz's mis-application of my approach to small data samples leads her to erroneous conclusions. My conclusions in my report hold: pass-through rates for various products sold by retailers are likely to be heterogeneous; and this heterogeneity is likely caused by differences in market conditions across different product categories, time-varying practices, and limitations in available data. Consequently, contrary to Dr. Netz's claim, disaggregated pass-through rates for CRT finished products cannot be reliably estimated using a regression-based formulaic approach.

Dr. Netz Has Not Demonstrated that She Has Examined a Representative Sample.

147. In her declaration and in her deposition, Dr. Netz contends that she attempted to generate a representative sample of CRT TV manufacturers for her pass-through analysis.²¹⁷ However, her analysis of pass-through rates at CRT TV manufacturers is confined to just two manufacturers, Funai and TACP. Similarly, her analysis of CRT monitor manufacturers is confined to just three: Tatung, Ben Q and TAIS. Of these, only TACP and TAIS were affiliated with a major finished product manufacturer (Toshiba). Not only is the sample small, these manufacturers' pass-through rates were diverse. I find that once the flaws in Dr. Netz's pass-through approach (which are explained above) are corrected, Funai's average pass-through rate was 34% whereas TACP's rate was so low that I cannot reject the possibility that it was zero at the 5% significance level. Among

²¹⁵ These results are based on Dr. Netz's original top-and-bottom data. However, as I explain in my report, (Willig Report, fn. 141), Dr. Netz made a mistake in compiling her top-and-bottom data (a mistake that she does not address in her rebuttal report), which led to the erroneous omission of some of the most prevalent CRT TV sizes sold in the U.S. such as 27-inch TVs. When I use corrected top-and-bottom data and recalculate the estimated pass-through coefficients for the same product categories, I find that the range of pass-through rates is somewhat narrower but still implausibly large, between -920% and 592%.

²¹⁶ The average number of model-months associated with estimated pass-through rates that are less than -800% or greater than 500% is 9.3. The average number of model-months associated with estimated pass-through rates between -86% and 258% (all the remaining models in the data) is 16.75.

²¹⁷ Netz Declaration, p. 9 and Netz Deposition, Vol. 2, p. 366

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monitor manufacturers, Tatung had an average pass-through rate of 18% while Ben Q had a rate of 58%.²¹⁸ Thus, not only does Dr. Netz have a very small sample of finished product manufacturers that includes just one major manufacturer, the entities in her sample passed through cost changes at widely divergent rates.

148. Dr. Netz claims that this small and diverse sample of manufacturers is nonetheless representative of the larger universe of manufacturers because “even ‘tiny’ samples are likely to be representative” since cost changes are likely to be passed through in a competitive environment.²¹⁹ However, she acknowledges that even in competitive industries, firms may not pass through changes in costs that affect only some products, are not significant, or are transitory,²²⁰ and I have explained above that the record evidence is not consistent with the view that the alleged cartel was consistently successful in increasing all or even most CRT prices. Thus, Dr. Netz has provided no sound reasons to conclude that her limited sample of CRT finished product manufacturers provides a reliable basis to opine about pass-through rates at the many manufacturers she has not analyzed.²²¹

149. Similarly, Dr. Netz contends that her retailer sample is representative of the larger population of retailers.²²² However, even among the retailers in her sample, the average pass-through rate she estimates is not necessarily representative of pass-through rates associated with specific finished products in specific periods. As I have explained above in paragraphs 117-118, the pass-through rates associated with specific models of finished

²¹⁸ Willig Report, Exhibit 25. Dr. Netz and I both find that the estimated average pass-through rate for TAIS was not statistically significantly different from zero. (Netz Initial Report, Exhibit 34).

²¹⁹ Netz Declaration, p. 9.

²²⁰ Netz Deposition Vol. 2, pp. 273-4, 323, 325.

²²¹ Dr. Netz contends that the small confidence interval associated with each pass-through rate estimate she generates is also evidence that her data are representative of the larger population of relevant entities. (Netz Declaration, p. 8) However, these confidence intervals are irrelevant for the issue of representativeness. It is possible to obtain small confidence intervals for pass-through rates for a sample that is not representative of the larger population of entities.

²²² Netz Declaration, pp. 7-8.

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products in certain months were substantially different from average pass-through rates estimated by Dr. Netz.

150. More generally, Dr. Netz has conducted no objective analysis of whether the samples of CRT TV and monitor sales she examines are representative of the relevant population of finished product sales. For example, she could have compared data from her sample of manufacturers with data from her sample of retailers to determine if the data are consistent. I have examined them and found them to be substantially inconsistent in their coverage of finished products. For instance, in 2003, about 88% of monitors sold by Dr. Netz's sample of retailers were 16 inches or 17 inches in size, whereas only 11% of monitors sold by Dr. Netz's sample of three monitor manufacturers were in that size range. Similar mismatches are apparent in other years and for other size groups of monitors and TVs, which indicate that the data are not likely to be representative. Even if Dr. Netz's sample of retailers and manufacturers were consistent in terms of the size distributions of TVs and monitors sold by such entities, the entities in her sample may not be representative of the overall population of retailers and manufacturers along other dimensions (such as business models employed) that potentially matter for pass-through rates. Dr. Netz has conducted no objective analysis of the representativeness of her sample along these dimensions.

V. Conclusion

151. While Dr. Netz claims to have used well-accepted principles of economics and undertaken peer-reviewed methodologies to establish the existence of a price structure in CRTs, her price structure conclusions are not supported by record evidence and reliable methodologies. More generally, Dr. Netz has failed to provide any valid support in her declaration for any of the three claims that underlie her proposed generalized approach for establishing classwide impact, which renders her approach essentially a series of inappropriately applied methodologies and unsupported assumptions leading to unreliable conclusions.

152. First, Dr. Netz has failed to demonstrate that any actual CRT price was higher than the corresponding target price, much less the corresponding but-for price. Indeed,

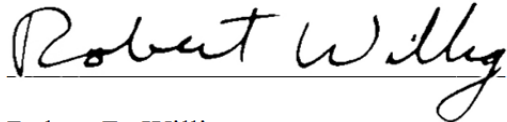
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she does not contest the point that her own data demonstrate that the majority of actual CRT sales prices were below the target prices that she identifies. Second, she has failed to demonstrate that a price structure exists since the evidence she offers as support for a price structure demonstrably does not, in fact, support her claimed existence of a price structure. Third, she has failed to establish her claim that pass-through rates were uniformly positive. She does not claim that the regression methodology can be used to test her view of uniform positive pass-through rates and she provides no empirical support for her claim of universal pass-through.

153. Overall, it is my conclusion that the fact of impact on all of the members of the proposed IPP class from the alleged collusion among the defendant CRT producers cannot be established by means of common evidence and methods. It is also my conclusion that Dr. Netz's proposed methodologies to establish common impact are unreliable and unsupported by record facts and economic theory.

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I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief. This declaration was executed on the 25th day of March 2013 in Princeton, New Jersey.

A handwritten signature in black ink, reading "Robert D. Willig". The signature is written in a cursive style with a horizontal line underneath the text.

Robert D. Willig

Attachment 1:
Expert Testimony Provided by Robert D. Willig in the Last Four Years

1. In the Matter of Verizon New Jersey, Inc. – Resolution for Assistance Resolving Interconnection Negotiations with US Cable of Paramus/Hillsdale, Time Warner Cable, Cablevision, and Comcast; Before the State of New Jersey Office of Board of Public Utilities, Docket No. CO07070524; expert report 4/21/2008, testimony 5/12/2008.
2. In the Matter of Verizon New Jersey, Inc. – Resolution for Assistance Resolving Interconnection Negotiations with US Cable of Paramus/Hillsdale, Time Warner Cable, Cablevision, and Comcast; Before the State of New Jersey Office of Board of Public Utilities, Docket No. CO07070524; expert report 4/21/2008, testimony 5/12/2008.
3. New England Carpenters Health Benefits Fund et al. v. First Databank, Inc., and McKesson Corp. In the United States District Court for the District of Massachusetts, Civil Action: 1:05-CV-11148-PBS, expert report 1/24/2007; rebuttal expert declaration 5/07/2007; expert declaration 10/15/2007; rebuttal expert declaration 11/08/2007; expert declaration 11/28/2007, expert declaration 5/21/08, expert report 10/1/08.
4. AT&T and Centennial; Before the Federal Communications Commission; WT Docket No. 08-246; expert report 11/20/2008.
5. In the Matter of Lisa Reed and Cindy Digiannantonio v. Advocate Health Care, et al. In the Northern District of Illinois Eastern Division, Civil Action No. 06 C 3337; expert report 1/20/2009; Supplemental 2/27/2009; deposition testimony 3/23/2009-3/24/2009.
6. In the matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless Including Commercial Mobile Services; Before the Federal Communications Commission; WT Docket No. 09-66; declaration, 9/30/09.
7. Cindy Cullen, Wendy Fleishman, on Behalf of Themselves and All Others Similarly Situated v. Albany Medical Center, Ellis Hospital, Northeast Health, Seton Health System, and St. Peter's Health Care Service, In the United States District Court for the Northern District of New York, Civil Action No. 06-CV-0765/ TJM/ DRH; expert report 2/29/2008; deposition 3/27-28/2008; expert report 9/4/2009; deposition 11/19-20/2009, declaration 12/28/2009.
8. In the Australian Competition Tribunal: Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 23 May 2006 under Section 44H(9) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Mount Newman

Railway Line, By: Fortescue Metals Group Limited; Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 27 October 2008 under Section 44H(1) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Robe Railway; By: Robe River Mining Co PTY LTD & ORS; Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 27 October 2008 under Section 44H(1) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Hamersley Rail Network, By: Hamersley Iron Co PTY LTD & ORS; Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 27 October 2008 under Section 44H(1) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Goldsworthy Railway, By: BHP Billiton Iron Ore PTY LTD and BHP Billiton Minerals PTY LTD; expert report 6/30/2009 and 9/18/2009, trial testimony 11/2/2009-11/6/2009.

9. Stagecoach Group PLC and Coach USA, Inc., et al, Acquisition of Control, Twin America, LLC, Before the Surface Transportation Board, Verified Statement of Professor Robert D. Willig, Submitted November 17, 2009.
10. In re: Rail Freight Fuel Surcharge Antitrust Litigation, In the United States District Court for the District of Columbia, MDL Docket No. 1869, Misc. No. 07-489 (PLF), expert report 8/1/2010, deposition 8/4/2010.
11. Before the Federal Reserve Bank: Docket Number R-1404: Proposed Rule on Debit Card Interchange Fees and Routing, written statement 2/22/2011.
12. Before the Surface Transportation Board: Docket Number EP 704: Review of Commodity, Boxcar, and TOFC/COFC Exemptions; written statement 1/31/2011; testimony at hearing 2/23, 24/2011.
13. New Zealand Commerce Commission vs. Malaysian Airline Systems Berhad, Ltd. and et. al.; High Court of New Zealand: CV 2008-404-8350, Brief of Evidence 4/28/2011, trial testimony 5/20/11 and 5/23-27/2011.
14. Before the Federal Communications Commission: Docket Number 11-65: For Consent to Assign or Transfer Control Licenses and Authorization, written reply statement 6/9/2011.
15. In Re: Checking Account Overdraft Litigation, MDL No. 2036 In the United States District Court for the Southern District of Florida, Miami Division, Case No. 09-MD-02036-JLK, Luquetta v. JPMorgan Chase Bank, Declaration In Support of JP Morgan Chase Bank, N.A.'s Opposition to Class Certification, June 16, 2011.
16. Before the Surface Transportation Board: Docket Number EP 705: Competition in the Rail Industry, written statement 4/12/2011, written reply statement 5/27/2011, testimony at hearing 6/22, 23/2011.

17. In the Matter of Rambus Inc. v. Micron Technology, Inc., et al. In the Superior Court of the State of California County of San Francisco, Civil Action No. 04-431105; expert report 11/08/2008; supplemental expert report 12/19/2008, deposition testimony 5/7/2009-5/8/2009, trial testimony 9/1,6,7/2011.
18. In Re McKesson Governmental Entities Average Wholesale Price Litigation, Master File No.: 1:08-CV-10843-PBS; The Board of County Commissioners of Douglas County, Kansas et al. v. McKesson Corp., expert report, April 14, 2010, Response Report, June 28, 2010; Related to Connecticut v. McKesson Corp., expert report, April 14, 2010; Related to Montana v. McKesson Corporation, expert report, November 8, 2010; Related to Oklahoma v. McKesson Corporation, expert report, November 8, 2010; San Francisco Health Plan, et al. v. McKesson Corporation, rebuttal expert report, 9/19/2011.
19. Before the Public Service Commission of Maryland, Case No.: 9271, In the Matter of the Merger of Exelon Corp. and Constellation Energy Group, Inc., written market power rebuttal testimony, 10/17/2011, written surrebuttal testimony 10/26/2011, hearing testimony, 11/2011.
20. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, DELL Inc., *et al.*, v. SHARP Corporation, *et al.*, Case No. 3:10-cv-01064 SI MDL No. 3:07-md-1827-SI, expert report 2/23/2012, deposition 4/18/2012.
21. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, Motorola Mobility Inc. v. SHARP Corporation, *et al.*, Case No. 3:09-cv-05840SI MDL No. 3:07-md-1827-SI, expert report 2/23/2012, deposition 4/18/2012.
22. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, AT&T Mobility Inc. v. SHARP Corporation, *et al.*, Case No. 09-cv-4997 SI MDL No. 07-m-1827-SI, expert report 2/27/2012, deposition 4/18/2012.
23. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, BEST BUY CO., Inc., *et al.*, v. AU OPTRONICS CORP., *et al.*, Case No. 10-cv-4572 SI MDL No. 07-md-1827-SI, expert report 3/5/2012, deposition 4/18/2012.
24. Clark R. Huffman and Brandi K. Winters, individually and on behalf of all others similarly situated vs. PRUDENTIAL INSURANCE COMPANY of AMERICA, In the United States District Court for the Eastern District of Pennsylvania, Civ. No. 2:10-cv-05135-EL, declaration 4/10/2012.
25. In re Prudential Insurance Company of America SGLI/VGLI Contract Litigation, CLASS ACTION, Master Case No. 3:11-md-02208-MAP, In the

United States District Court for the District of Massachusetts, declaration 5/10/2012.

26. Australian Competition and Consumer Commission v. Singapore Airlines Cargo PTE LTD et. al., Before the Federal Court of Australia, District Registry: New South Wales, Division: General, No. NSD 1980 of 2008, NSD 363 of 2009, NSD 876 of 2009 and NSD 1213 of 2009, affidavit and expert report 7/12/2012.
27. Bandspeed, Inc. v. Sony Electronics, Inc. et al. and Cambridge Silicon Radio Limited, Cause No. A-11-CV-771-LY, In the United States District Court for the Western District of Texas, Austin Division, expert report, 9/21/2012.
28. National Collegiate Athletic Association et al., Plaintiffs, v. Christopher J. Christie et al., Defendants, In the United States District Court for the District of New Jersey, Civil Action No. 3:12-cv-04947 (MAS) (LHG), expert report 11/21/2012, deposition 11/30/2012.
29. In Re Cathode Ray Tube (CRT) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, Master File No. CV-07-5944-SC MDL No. 1917, expert report 12/17/12, deposition 01/24/12.
30. In Re Titanium Dioxide Antitrust Litigation, In the United States District Court of Maryland Northern Division, Case No. 1:10-cv-00318-RDB, expert report 12/21/2012, deposition testimony 02/07/2013, 02/08/2013.
31. PPL EnergyPlus, LLC, et al., v. Douglas R.M. Nazarian, in his official capacity as Chairman of the Maryland Public Service Commission, et al., In the United States District Court of Maryland Northern Division, Case No. 1:12-cv-01286-MJG, expert report 12/21/2012, supplemental expert report 02/01/2013, deposition testimony 02/14/2013, trial testimony 03/08/2013.
32. PPL EnergyPlus, LLC, et al., v. Lee A. Solomon, in his official capacity as President of the New Jersey Board of Public Utilities, et al., In the United States District Court for the District of New Jersey, Case No. 3:11-cv-00745-PGS-DEA, expert report 02/06/2013, deposition 02/14/2013 and 02/21/2013.

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Attachment 2: Materials Relied Upon by Robert D. Willig

Academic Citations

Bulow, J. I., J. D. Geanakoplos, and P. D. Klemperer. "Multimarket Oligopoly: Strategic Substitutes and Complements." Journal of Political Economy, Vol. 93, No. 3. (1985).

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Declarations

Declaration of Janet S. Netz, Ph.D., in Support of Indirect-Purchaser Plaintiffs' Opposition to Defendants' Motion to Strike the Proposed Expert Testimony of Dr. Janet S. Netz, February 15, 2013.

Expert Report of Robert D. Willig, December 17, 2012 and all materials cited in Attachment 3 of the report.

Rebuttal Declaration of Janet S. Netz, Ph.D., in Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, February 15, 2013.

Depositions and Exhibits

Deposition of Janet S. Netz, November 15, 2012

Deposition of Janet S. Netz, March 15, 2013

Data

Board of Governors of the Federal Reserve System, "Exchange Rates.xlsx"

Bureau of Labor Statistics, "microprocessor_ppi.xls"

World Bank, "energy_prices.xlsx"

World Bank, "crude_oil.xlsx"

OECD, "total_production.xlsx"

Document Submitted Partially Under Seal

OECD “unemployment.xlsx”

Best Buy, “BBYCRT000081_Highly Confidential û AttorneysÆ Eyes
Only_CRT_PO_01_07.csv”

Kmart, KMRT_CRT00000001 - KMRT_CRT00000016

Radio Shack, RADS_CRT00000003 - RADS_CRT00000009

Sears, SEAR_CRT00000007, SEAR_CRT00000011- SEAR_CRT00000020,
SEAR_CRT00000022

Other Materials

CHU00022724E-CHU00022725E

CHU00022728E-CHU00022730E

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CHU00028701E-CHU00028703E

CHU00028746E-CHU00028748E

CHU00028760E-CHU00028762E

CHU00028768E-CHU00028770E

CHU00028773E-CHU00028774.02E

CHU00028959E

CHU00028975E-CHU00028976.02E

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CHU00029065E-CHU00029067E

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CHU00029185E-CHU00029188E

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CHU00030917E-CHU00030919.02E

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CHU00031018E-CHU00031020E

CHU00031051E-CHU00031055E

CHU00031101E-CHU00031104E

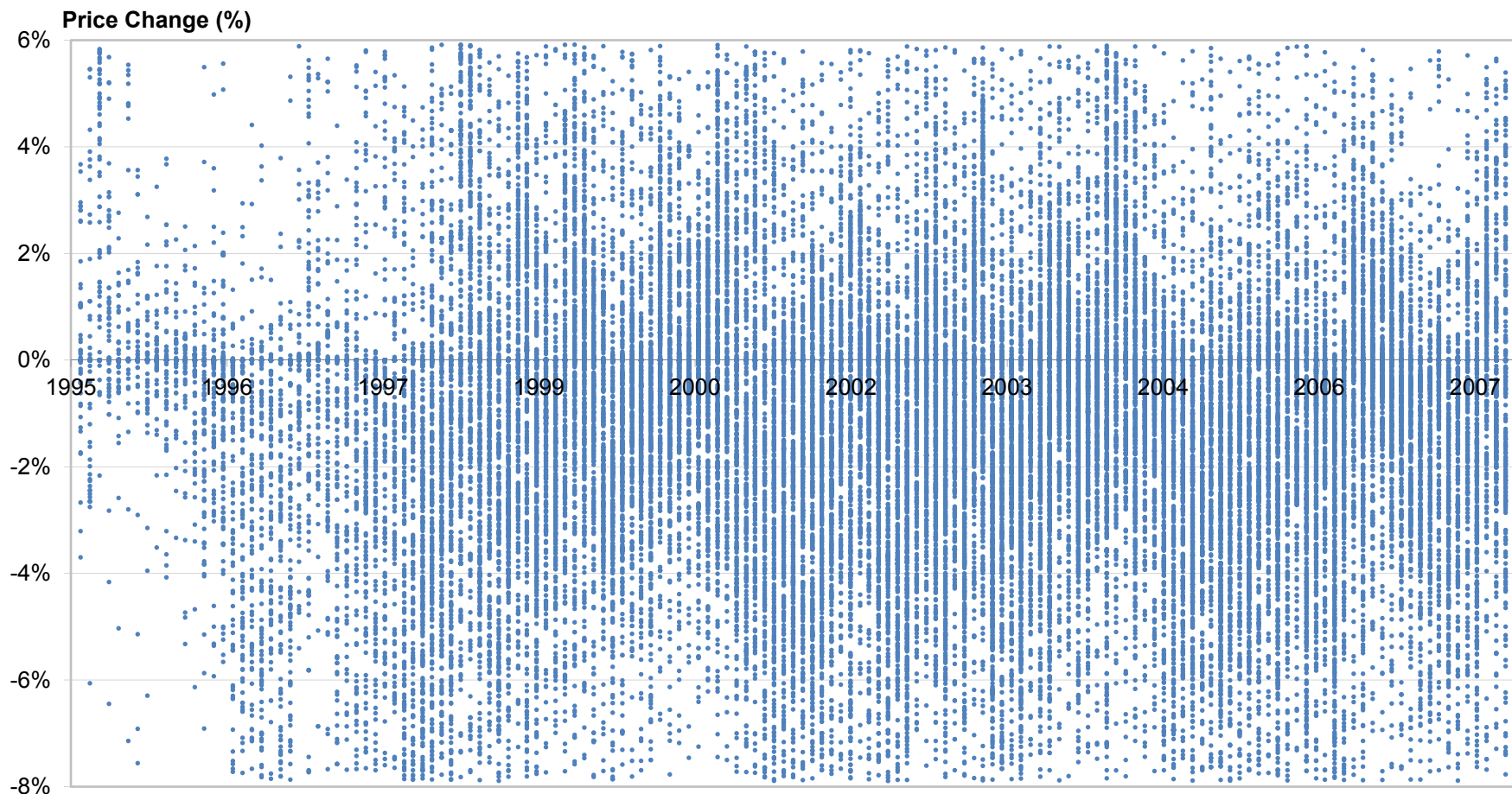
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CHU00660366E-CHU00660368E

CHU00660408-CHU00660418

SDCRT-0087312-SDCRT-0087314

SDCRT-0087741

Exhibit 2A-R: Heterogeneity in Monthly Changes in CRT Negotiated Prices

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes: (1) A point on the above chart represents the month-to-month change in the volume-weighted average price expressed in the currency in which the price was negotiated for a given CRT model sold to a given customer in a given currency over two consecutive months; (2) Observations for which the model number, customer name, currency, or sales amount were missing were excluded; (3) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range; (4) Sales between integrated entities that sold CRTs were excluded; (5) A *de minimis* number of observations are outside the bounds of the y-axis.

Exhibit 3A-R: Heterogeneity of CRT Negotiated Price Movements by Application, CPT Size, and CPT Shape

	Category 1	Category 2	Fraction of Prices of CRTs in Category 2 that Changed in the Opposite Direction to the Change in the Fisher Price Index for Category 1	Fraction of Prices of CRTs in Category 2 that Did Not Change Despite Change in the Fisher Price Index for Category 1	Sum of the Previous Two Columns
Differences Across Categories	CDT	CPT	17%	37%	53%
	CPT	CDT	21%	18%	39%
	Flat	Curved	20%	29%	49%
	Curved	Flat	16%	40%	56%
	Small	Large	16%	45%	61%
	Large	Small	18%	34%	52%
	Large	Medium	19%	30%	49%
	Medium	Large	15%	41%	56%
Differences Within Categories	CDT	CDT	13%	16%	29%
	CPT	CPT	13%	33%	46%
	Flat	Flat	15%	30%	46%
	Curved	Curved	16%	31%	47%
	Small	Small	14%	38%	52%
	Medium	Medium	13%	31%	44%
	Large	Large	14%	35%	49%

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, SDI, and Toshiba.

Notes:

(1) The Global CRT Sales Data range from 3/1995-11/2007;

(2) Global sales data were used;

(3) A price observation in this analysis represents the month-to-month change in the volume-weighted average price expressed in the currency in which the price was negotiated for a given CRT model sold to a given customer in a given currency over two consecutive months;

(4) The month-to-month change in the Fisher Price Index for CPTs (for example) represents an average across all CPT models, customers, and currencies of the changes in the prices, expressed in the currency in which they were negotiated, by a given customer for a given model in a given currency; the price changes across months one and two are averaged in two ways - once using the month one sales volumes and once using the month two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes;

(5) The fractions reported in the table were calculated as follows:

- Step 1: The 25% of months that saw the largest absolute month-to-month changes in the Fisher Price Index for CRTs in Category 1 were identified;

- Step 2: For each month identified in Step 1, (a) the fraction of prices of CRTs in Category 2 (weighted by sales volume) that changed in the opposite direction of the Category 1 Fisher Price Index and (b) the fraction whose prices did not change at all during the same time period were then estimated;

- Step 3: These fractions were averaged across all months identified in Step 1 using the sales volumes (by model, customer, currency and month) of CRTs in Category 2 as weights;

(6) The Flat/Curved and Small/Medium/Large categories refer to CPTs only. The size categories are defined as follows: Small (0-19"), Medium (20-29"), Large (30+");

(7) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range;

(8) Sales between integrated entities that sold CRTs were excluded.

Exhibit 9-R: Heterogeneity of Negotiated Price Movements by Region (North America vs. ROW)

Category 1	Category 2	Fraction of Prices (by Model) of CRTs in Category 2 that Changed in the Opposite Direction to the Change in the Fisher Price Index for Category 1	Fraction of Prices of CRTs in Category 2 that Did Not Change Despite Change in the Fisher Price Index for Category 1	Sum of the Previous Two Columns
NA CPTs	Foreign CPTs	28%	25%	54%
Foreign CPTs	NA CPTs	17%	36%	53%

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, and Panasonic.

Notes:

(1) The Global CRT sales data range from 3/1995-11/2007;

(2) Global sales data were used. North American and ROW sales identified using country and/or address fields;

(3) A price observation in this analysis represents the month-to-month change in the volume-weighted average price expressed in the currency in which the price was negotiated for a given CRT model sold to a given customer in a given currency over two consecutive months;

(4) The month-to-month change in the Fisher Price Index for Foreign CPTs (for example) represents an average across all CPT models, customers, and currencies, for all CPT sales outside North America, of the changes in the prices, expressed in the currency in which they were negotiated, by a given customer for a given model in a given currency; the price changes across months one and two are averaged in two ways - once using the month one sales volumes and once using the month two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes;

(5) The fractions reported in the table were calculated as follows:

- Step 1: The 25% of months that saw the largest absolute month-to-month changes in the Fisher Price Index of CRTs in Category 1 were identified;
- Step 2: For each month identified in Step 1, (a) the fraction of prices of CRTs in Category 2 (weighted by sales volume) that changed in the opposite direction of the Category 1 Fisher Price Index and (b) the fraction whose prices did not change at all during the same time period were then estimated;
- Step 3: These fractions were averaged across all months identified in Step 1 using the sales volumes (by model, customer, currency, and month) of CRTs in Category 2 as weights;

(6) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range.

(7) Sales between integrated entities that sold CRTs were excluded.

Exhibit 16A-R: Regressions of Changes in Actual Price on Changes in Target Price

Row	Dependent Variable	Independent Variables			Merchant Sales Only?	Transfer Sales Only?	Group Includes Shape?	Results			Robustness Checks	
	Change in Actual Price (Level of Aggregation)	Change in Alleged Target Price (Level of Aggregation)	Change in Macroeconomic Variables	Change in Negotiated Price Currency-to-USD Exchange Rate Variables				Number of Observations	Coefficient on Change in Target Price	R-Squared	Range of Estimated Coefficients on the Change in Target Price	R-Squared Range
1	Model, Customer, Currency, Month	Group, Month						12,255	0.162***	0.056	0.118*** - 0.240***	0.033 - 0.079
2	Model, Customer, Currency, Month	Group, Month			X			11,732	0.171***	0.061	0.125*** - 0.219***	0.037 - 0.084
3	Model, Customer, Currency, Month	Group, Month				X		523	-0.001	0.000	-0.036 - -0.001	0.000 - 0.004
4	Model, Customer, Currency, Month	Group, Month	X					12,255	0.141***	0.048 ⁺	0.099*** - 0.203***	0.028 ⁺ - 0.074 ⁺
5	Model, Customer, Currency, Month	Group, Month		X				12,255	0.148***	0.148	0.106*** - 0.211***	0.131 - 0.153
6	Model, Customer, Currency, Month	Group, Month					X	4,669	0.186***	0.048	0.168*** - 0.257***	0.040 - 0.065

Sources:

(1) Global CRT sales data for Chunghwa, MTPD, Panasonic, LPD, SDI, and Toshiba;

(2) Netz Target Price data.

Notes: See Exhibit 16B-R for notes.

Exhibit 16B-R: Regressions of Changes in Actual Price on Changes in Target Price**Notes:**

(1) Actual prices were calculated for month t by manufacturer, model, customer, and the currency in which prices were negotiated ("model-customer-currency") using global CRT sales data for November 1996 to May 2006;

(2) Target prices were calculated for month t by "group," which is defined in terms of manufacturer, CRT type (CDT/CPT), size, and finish (bare/ITC) (and also shape in row 6);

(3) Actual and target price changes represent the average monthly percentage actual price change (divided by a hundred) for a given model-customer-currency and the average monthly percentage target price change (divided by a hundred) for the corresponding group between months t and $t-x$, where x is defined as the smallest positive integer (possibly equal to 1) for which there were actual prices for the model, currency, and customer and target prices for the group in months t and $t-x$. That is, the actual and target prices changes were calculated over the same period of time, and x represents the shortest period over which this was possible;

(4) The following price changes were excluded as outliers: (a) price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution; and (b) price changes that exceeded the 75th percentile of the distribution plus 3 times the interquartile range;

(5) Sales between integrated entities that sold CRTs were excluded.

(6) Observations for which the model number, customer name, currency, or sales amount were missing were excluded, and observations with more than one year between the observed pairs of actual price changes and target price changes were excluded;

(7) The macroeconomic variables are: (a) the unemployment rate and total industrial production for the G7 countries (the United States, the United Kingdom, Germany, France, Italy, Japan, and Canada); (b) exchange rates between the U.S. Dollar and the Japanese Yen, Korean Won, Taiwanese New Dollar, and Brazilian Real; and (c) microprocessor, energy, and crude petroleum price indices. The change in each macroeconomic variable represents the percentage change (divided by a hundred) in that variable between months t and $t-x$, where t and x are defined according to Note #3 above (the only exception is the change in the G7 unemployment rate, which represents the percentage point change in that variable between months t and $t-x$).

(8) For the model that includes changes in macroeconomic variables on the right-hand side (row 4), the R-squared statistic reported in the table (denoted with a +) represents the R-squared attributable only to the change in the alleged target price. I use the same method for decomposing the R-squared that Dr. Netz employs in her hedonic price analyses presented in Exhibits 21-24 of her initial report.

(9) The negotiated price-to-U.S. dollar exchange rate ("the exchange rate") represents the average exchange rate (weighted by daily sales volume for transactions-level sales data) for month t between the currency in which the actual price for a given model-customer-currency was negotiated and U.S. dollars. The change in the exchange rate represents the percentage change (divided by a hundred) in the exchange rate between months t and $t-x$, where t and x are defined according to Note #3 above. The model reported in row 5 includes the change in the exchange rate and interactions between this variable and a series of eight "dummy" variables that take the value 1 if the currency in which the actual price was negotiated is the Brazilian Real, German Deutsche Mark, Euro, Japanese Yen, Korean Won, Malaysian Ringgit, Chinese Yuan, or Taiwanese New Dollar, respectively, and zero otherwise. To avoid collinearity there is no dummy variable that equals 1 for prices negotiated in U.S. Dollars.

(10) I performed the following robustness checks (where feasible) on each of the regressions presented in the above table:

- weighting observations by sales volume;
- varying the maximum period between pairs of actual and target price changes;
- aggregating actual and target prices by group and month;
- aggregating prices by target price document rather than by month;
- using robust standard errors;

The range of results from these robustness checks are reported in the table;

(11) (***) indicates that the estimated coefficient is different from zero at the 0.1% significance level.

EXHIBIT 38

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

IN RE: CATHODE RAY TUBE (CRT)
ANTITRUST LITIGATION

THIS DOCUMENT RELATES TO:
DIRECT PURCHASER CLASS ACTION

Master File No. CV-07-5944-SC
MDL No. 1917

EXPERT REPORT OF ROBERT D. WILLIG

09/10/13

**DOCUMENT SUBMITTED PARTIALLY UNDER SEAL
AND CHAMBERS COPY**

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I. Introduction

A. Qualifications

1. I am a Professor of Economics and Public Affairs at the Woodrow Wilson School and the Economics Department of Princeton University, USA. I am also a Senior Consultant at Compass Lexecon, an economics consulting firm based in the U.S. Previously, I was a Supervisor in the Economics Research Department of Bell Laboratories. My teaching and research have specialized in the fields of industrial organization, government-business relations, and welfare theory.

2. I have extensive experience analyzing economic issues arising under the law. From 1989 to 1991, I served as Chief Economist in the Antitrust Division of the U.S. Department of Justice, where I led the development of the 1992 *Horizontal Merger Guidelines*. I met with outsiders, weighed evidence, and participated in decisions on when to use enforcement power. Core to my work were issues pertaining to alleged conspiracies and market competition. I am the author of *Welfare Analysis of Policies Affecting Prices and Products* and *Contestable Markets and the Theory of Industry Structure* (with William Baumol and John Panzar) as well as numerous articles. I have served on the editorial boards of *The American Economic Review*, *The Journal of Industrial Economics*, and the *MIT Press Series on Regulation*. Also, I have served as a consultant and advisor to the Federal Trade Commission, the Department of Justice, the OECD, the Inter-American Development Bank, the World Bank, and the governments of many nations.

3. I was invited by the Pennsylvania Bar Institute, Antitrust Law Committee CLE and the PLI Annual Antitrust Law Institute in 2007 to give talks on class certification matters, and I have prepared expert reports on class certification matters.

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4. I have been retained by the defendants in CRT litigation related to Indirect Purchaser Plaintiffs' claims of CRT price fixing, and I have filed two reports in that litigation.¹

5. My curriculum vitae, which includes a list of my publications, is at Attachment 1. A list of matters in which I have given sworn testimony as an expert during the past four years, at trial or in deposition, is at Attachment 2.

B. Assignment

6. The allegations in this case involve a conspiracy to elevate the prices of cathode ray tubes ("CRTs"). Plaintiffs allege that Defendants² and their co-conspirators successfully colluded to elevate the prices of CRTs sold in the U.S. between March 1995 and November 2007 (the class period). Plaintiffs have asked the Court to certify a class of direct purchasers ("the DPP class") consisting of "all persons and entities who directly purchased a Cathode Ray Tube Product, ..., in the United States from any Defendant or any subsidiary or affiliate thereof [during the class period]."³

7. I understand that it is incumbent on Plaintiffs to show that injury and damages to the DPP class as a result of the actions of the alleged cartel of CRT manufacturers during the class period can be established using common evidence and common methods, i.e., that the conduct at issue had a "common impact" on members of the proposed class of direct purchasers.

¹ Expert Report of Robert D. Willig, December 17, 2012; and Rebuttal Declaration of Robert D. Willig, March 25, 2013.

² The following firms are listed as Defendants in the relevant complaint: Chunghwa Entities; Daewoo Entities; Hitachi Entities; Irico Entities; LG Electronics Entities; Panasonic Entities; Philips Entities; LG Philips Display (listed under Philips Entities); Samsung Electronics entities; Samsung SDI entities; Thai-CRT; Toshiba Entities; Samtel; Tatung Company of America, Inc. (Direct Purchaser Plaintiffs' Consolidated Amended Complaint, March 16, 2009, pp. 5-18.) However, I understand that Plaintiffs have settled or dismissed their claims against all but Hitachi and Samsung SDI.

³ Direct Purchaser Plaintiffs' Consolidated Amended Complaint, March 16, 2009, p.1.

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8. I have been retained by Defendants Hitachi and Samsung SDI (“SDI”)⁴ to:
- a) Address whether Plaintiffs are likely to be able to demonstrate, at a single trial, through common proof on a class-wide basis, that all or virtually all of the members of the proposed class suffered economic injury from the alleged conspiracy;
 - b) Review the expert report filed by Dr. Jeffrey Leitzinger, the economic expert for the DPP class, and opine on the analyses and views presented therein.

9. As a starting point for my analysis, I assume that the DPP class is correct in its allegation that the group of defendant CRT manufacturers and their alleged co-conspirators attempted to elevate prices of some CRTs to direct purchasers during the relevant period. However, I do not assume that the alleged cartel was effective in its attempts to elevate prices to any or all direct purchasers of CRTs during the nearly thirteen-year class period. Instead, I investigate whether, as an empirical matter, the fact and extent of impact on all direct purchasers can be assessed using common evidence and methods.

10. A list of the information and data I relied upon in forming the opinions expressed herein is attached at Attachment 3. My opinions expressed herein are based on those materials and data, my previous work related to the indirect purchaser class CRT litigation, my knowledge and experience in industrial organization economics and antitrust economics, my experience in antitrust enforcement at the Department of Justice, and my experience in advising and consulting with clients on competition matters over the past 30 years, both here and abroad.

11. The opinions expressed in this report reflect the information and facts I believe to be true at the time this report is filed. I reserve the right to revise my opinions if additional information and facts supplied in discovery or through subsequent expert reports and depositions make such revisions appropriate.

⁴ I was also retained by SEA and SEC until May 22, 2013, the date the DPP class voluntarily dismissed those companies from their case.

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12. Compass Lexecon is being compensated for my work at my usual hourly rate of \$1,350 which is the same rate for research and testimony. This compensation is in no way connected to the outcome of this litigation.

II. Summary of Conclusions

13. The proposed DPP class is extremely broad. It encompasses CRTs as well as CRT finished products (i.e., TVs and monitors containing CRTs), CRTs used in TVs and in monitors, and it includes CRTs sold in all geographic regions since Plaintiffs allege that there was a global conspiracy.⁵

14. Given the complexities of the CRT marketplace during the class period, my overall conclusion is that common methods and evidence cannot be used validly to assess the impact of the alleged cartel on all or almost all members of the proposed DPP class. Instead, an individualized examination would be required to determine whether any particular direct purchaser actually paid a cartel overcharge when purchasing a given CRT or CRT finished product. This opinion is based on the following findings:

- a) CRT price dynamics were complex and heterogeneous during the cartel period because of differentiated market forces in the CRT marketplace. For example, CDTs and CPTs were distinct products subject to different market forces. CDTs were affected earlier and more extensively by competition from LCD and plasma technologies than CPTs, and this differentiated impact is evident in the earlier and more rapid decline of CDT prices than CPT prices.
- b) Despite the evidence of heterogeneity in the CRT marketplace, Dr. Leitzinger's conclusions are based on analyses that pool together all or most CRTs. For example, Dr. Leitzinger provides only a single average overcharge estimate for all CRTs. Such aggregation is inappropriate given the heterogeneous market forces acting on the various CRT segments, in particular, on CPTs and CDTs. When Dr. Leitzinger's overcharge model is implemented separately for CPTs and CDTs, it estimates that the aggregate overcharge for all CDTs sold during the class period is not statistically distinguishable from zero and the same is true for certain categories of CPTs.

⁵ I understand that although plaintiffs allege a global conspiracy, their claims are confined to the U.S. (Direct Purchaser Plaintiffs' Consolidated Amended Complaint, March 16, 2009, ¶¶ 214-215.)

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Similarly, when pass-through rates are estimated separately for TVs and monitors, TVs are found to have a pass-through rate that is not statistically distinguishable from zero.

- c) Dr. Leitzinger's conclusions rest on analyses that make no distinction between CPT sales in North America and sales elsewhere. For example, Dr. Leitzinger's overcharge analysis pools together CPT sales in North America with CPT sales in the rest of the world. However, most CRT TVs sold in the U.S. contained CPTs manufactured in North America. Moreover, prices of CPTs sold in North America exhibited different price dynamics from prices of CPTs sold in the rest of the world, reflecting different CRT market conditions across regions. When Dr. Leitzinger's overcharge model is implemented separately for North American CPT sales, it estimates that the aggregate overcharge for CPTs sold in North America during the class period was not statistically distinguishable from zero. For CDTs sold in North America, overcharges were negative and statistically significant.
- d) The alleged cartel was unlikely to have been successful in elevating CRT prices class-wide, as evidenced by the fact that the target prices that Dr. Leitzinger contends were set by the alleged cartel were poor predictors of actual CRT prices.

15. I briefly summarize my more detailed conclusions below, and provide my analyses in the body of this report.

A. There Is No Evidence of Sustained and Effective Collusion Across All CRTs Purchased by the Proposed Class.

16. Dr. Leitzinger's opinion (contrary to mine) that class-wide impact can be established using common methods and evidence rests on three claims: (a) the alleged cartel set "target prices" for CRTs that accounted for a majority of CRT sales, and the Defendants and their alleged co-conspirators were successful in elevating CRT sales prices based on those target prices; (b) a so-called "price structure" existed for CRTs; (c) pass-through rates were uniformly positive across all CRT finished products, *i.e.*, there was universal or near-universal pass-through of allegedly elevated CRT prices by manufacturers of TVs and monitors. If either (a) or (b) is incorrect, then his entire methodology for establishing common impact on direct purchasers of CRTs collapses. For purchasers of CRT finished products, all three of these claims must be correct. In fact, all three claims are fundamentally incorrect, and the evidence cited by Dr. Leitzinger does not support his conclusions, thereby rendering his conclusions unreliable, as I explain below.

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Record Evidence and Economic Logic Indicate that the Alleged Cartel Was Unlikely to Have Elevated Prices of All or Most CRTs (If Any).

17. Several features of the CRT marketplace (such as opaque pricing) imply that the alleged cartel may not have been consistently effective in increasing CRT prices class-wide (if at all). Indeed, the documents cited by Dr. Leitzinger as evidence that the alleged cartel members met in order to set alleged target prices strongly indicate that the alleged cartel was not consistently effective in elevating prices. Many of these documents indicate that participants found CRT pricing by other suppliers to be opaque and that alleged cartel members often engaged in pricing conduct that deviated from what Dr. Leitzinger refers to as “target prices” set by the putative cartel.

18. The documentary evidence of breakdowns in the alleged cartel is supported by data on actual CRT prices. In particular, the actual prices that the alleged cartel members charged for CPTs were typically below the alleged target prices. Specifically, 76% of CDT unit sales and 56% of CPT unit sales in CRT categories for which Dr. Leitzinger identified an alleged applicable target price during the class period were priced below that target price. Because Dr. Leitzinger has not presented any but-for prices for particular CRTs, he has provided no basis that would allow a fact-finder to ascertain which, if any, of the substantial majority of CRTs priced below the alleged applicable target prices were priced above the but-for price.

19. In order to further examine whether the evidence is consistent with the cartel having a class-wide impact, I have also employed an econometric model to test whether changes in actual prices tended to track changes in target prices. If the alleged target prices had a class-wide impact on actual prices, then quarter-to-quarter changes in the alleged target prices identified by Dr. Leitzinger should reliably predict changes in the actual prices for the corresponding CRT models. Instead, I find that the variation in quarter-to-quarter changes in the alleged target prices explain only 3.3% of the variation in actual prices for the corresponding CRT models. The fact that changes in the alleged target prices are such extremely poor predictors of changes in actual prices demonstrates that the alleged cartel was far from consistently effective (if at all).

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20. Part of the lack of consistent adherence to target prices identified by Dr. Leitzinger was likely due to the fact that during the class period some alleged cartel members were vertically integrated. The vertically integrated manufacturers typically sold CRTs to affiliated and non-affiliated downstream finished-product manufacturers. Because the transfer price paid by an affiliated downstream finished-product manufacturer to an upstream CRT manufacturer was likely to be opaque to other CRT manufacturers, integrated firms may have found it easier to deviate from the cartel agreement without being detected. Data on CRT sales prices bear this out since they show effectively *zero* relationship between changes in the alleged target prices and changes in the actual prices of CRTs sold to affiliated downstream finished-product manufacturers.

Dr. Leitzinger's Analyses of Actual and Target Price Data Do Not Establish Class-wide Impact.

21. Dr. Leitzinger reviews the same data but reaches a different conclusion. In particular, he contends that the cartel agreed to set “target” prices that “extended directly to CRTs representing the vast majority of total sales.”⁶ He also presents a regression analysis of actual prices on target prices that he purports shows that these target prices “had a demonstrable effect on actual prices paid.”⁷ Finally, he presents a hedonic regression analysis that purports to show that the alleged cartel had a class-wide impact on CRT prices. However, Dr. Leitzinger’s analyses do not establish class-wide impact.

22. Dr. Leitzinger states, “[T]he share of shipments represented by the targeted CRTs was 90 percent for CPTs and 99 percent for CDTs ... That result, by itself, would go a long way towards establishing the existence of broad impact on the part of the alleged conspiracy.”⁸ However, Dr. Leitzinger’s conclusion does not follow from the figures he

⁶ Corrected Expert Report of Jeffrey J. Leitzinger, Ph.D., August 1, 2013 (“Leitzinger Report”), ¶ 6. Dr. Leitzinger also filed an expert report in this litigation on May 14, 2013 (Expert Report of Jeffrey J. Leitzinger, Ph.D., May 14, 2013). All references herein to his report refer to the August 1, 2013 Corrected Expert Report.

⁷ Leitzinger Report, ¶ 6 and § VI A.

⁸ Leitzinger Report, ¶ 40.

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reports because the figures do not show that target prices existed for 90-plus percent of CRT sales. Rather, Dr. Leitzinger obtained such high shares by *counting every CRT sold during the entire class period* for a particular application (CDT or CPT) and size (“category”) if he identified even one alleged target price for one manufacturer of one particular variety of that category of CRT in one quarter during the class period. In fact, Dr. Leitzinger identified allegedly applicable target prices for at most only 6% of CDT shipments and 24% of CPT shipments during the class period.

23. Dr. Leitzinger’s actual-price target-price regression analysis at most demonstrates the existence of a positive relationship between actual prices and the alleged target prices, which does not establish that the alleged target prices had an impact on actual CRT prices. For example, to the extent that the control variables that Dr. Leitzinger included in his regression do not capture all of the market forces that affected both actual and target prices, one would expect to observe a positive relationship between actual and target prices regardless of the extent to which target prices influence actual prices.

24. Dr. Leitzinger’s actual-price target-price regression analysis also does not demonstrate that there was a class-wide relationship between actual and target prices. As an initial matter, the regression is essentially silent regarding the relationship between actual prices and target prices for CDTs, as only 3 of the 3,151 observations in his regression involve CDT sales. These three observations represent only 0.03% of all CDTs sold during the class period. Additionally, Dr. Leitzinger’s actual-price target-price regression analysis estimates only the *average* relationship between actual and target prices. Thus, Dr. Leitzinger’s actual-price target-price regression analysis provides no guidance as to whether the relationship (much less impact) was uniform or even positive across the CRTs ultimately purchased by the proposed class. As discussed above, the fact that *changes* in the alleged target prices were poor predictors of *changes* in actual prices demonstrates that the alleged cartel was far from consistently effective (if at all).

25. In order to further confirm these results, I examined whether the alleged target prices, expressed in the same functional form as in Dr. Leitzinger’s analysis, are reliable predictors of actual price *levels*. A statistical analysis of actual and target prices reveals

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that a prediction of the sales price of a given panel in a typical quarter, based on the alleged applicable target price that quarter, would be wrong by a material amount, which confirms my finding that target CRT prices are poor predictors of actual CRT prices.

26. Moreover, Dr. Leitzinger's actual-price target-price regression analysis suffers from methodological flaws that cause him to substantially inflate his estimate of the *average* relationship between actual prices and the alleged applicable target prices identified by Dr. Leitzinger (which, again, does not apply to CDTs and does not demonstrate impact, even on average).

27. Dr. Leitzinger attempts to show class-wide impact through a series of hedonic regressions. These regressions attempt to predict CRT prices based on several product characteristics, the transaction quantities, and brand value. Dr. Leitzinger asserts that the high R-squared statistics in his hedonic regressions imply that product characteristics and other factors included in those regressions explain a substantial portion of the variation in CRT prices and therefore "selective conspiracy impacts do not appear to be the reason for the observed [CRT] price variability."⁹ However, the R-squared statistics in Dr. Leitzinger's hedonic regression analysis are irrelevant for the purpose of establishing that any impact was class-wide – even if the alleged cartel failed to have any impact at all on large segments of CRTs, Dr. Leitzinger's hedonic regression could produce high R-squared statistics, as Dr. Leitzinger acknowledged in his recent deposition testimony.¹⁰

B. There Is No Evidence of a Price Structure.

Actual Pricing Data Are Wholly Inconsistent with the Existence of a Structure in Prices of CRTs and CRT Finished Products.

28. Dr. Leitzinger's conclusion of common impact rests heavily on his claim that CRT prices exhibited a "structure" such that prices of various categories of CRTs were linked economically and moved closely together.

⁹ Leitzinger Report, ¶ 38.

¹⁰ Deposition of Dr. Jeffrey Leitzinger, August 22, 2013 ("Leitzinger Deposition"), pp. 200-201.

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29. However, CRTs were widely differentiated along many dimensions. For example, I understand that CPTs were used exclusively in televisions, whereas CDTs were used predominantly in desktop computer monitors and were not used in televisions. From the standpoint of manufacturers of monitors and TVs, CPTs and CDTs were not substitutes. Other factors such as customization of CRTs limited the extent of demand and supply substitution of CRTs. Moreover, some CRTs were sold by manufacturers such as Toshiba that were vertically integrated for at least part of the class period, while other CRTs were supplied by CRT manufacturers such as Chunghwa that were not integrated. This heterogeneity in the extent of vertical integration of CRT suppliers created divergent incentives when setting CRT prices.

30. The heterogeneity in CRTs is reflected in the considerable heterogeneity in CRT prices and in CRT price movements. An examination of CRT price data shows that prices of CRTs did not move together. Instead, prices of CRTs moved disparately, with some prices increasing, others decreasing, and the rest remaining relatively constant. The same is also true of the prices of CRT finished products.

31. The heterogeneous price dynamics of CRTs and CRT finished products likely were the result of differentiated features of these products and, more importantly, the result of substantially different market forces that influenced the prices of different CRT product segments at various points during the class period. For example, from 2000 onward, fierce competition from LCD and plasma display technologies rapidly shrank the CRT share of the display market. This development affected CDTs earlier and more than CPTs. Moreover, competition from alternative technologies affected large CPTs more than small and medium CPTs.

32. In addition to the differentiated price dynamics across product categories, there is substantial evidence of diverse price dynamics across geographic regions. This is another source of differentiation in CRT price dynamics, particularly for CPTs. This is particularly relevant here because although the U.S.-based Plaintiffs allege a global CRT cartel, a substantial volume of CPTs used in TVs sold in the U.S. were manufactured or sold in North America. Market conditions for CPTs in North America were different from those in the rest of the world. Given these facts, it would not be surprising if CPT

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prices in the U.S. and North America were different from CPT prices in the rest of the world. Indeed, prices of CPTs sold in North America had substantially different patterns of changes than prices of CPTs sold in the rest of the world.

Dr. Leitzinger's Price Correlation Analysis Does Not Support the Existence of a Price Structure or Common Impact.

33. Dr. Leitzinger contends that the alleged cartel broadly elevated CRT prices in part because the prices of non-targeted CRTs were linked to the prices of targeted CRTs by a “price structure” wherein these linked prices generally tracked one another closely. To support this claim, Dr. Leitzinger conducts a “correlation analysis” of CRT prices that he contends shows that the average sales prices of *non-targeted* categories of CRTs moved closely with the average sales prices of *targeted* categories of CRTs.

34. However, correlations of the type estimated by Dr. Leitzinger are most likely spurious, produced by basic flaws long recognized by economists. In fact, even if the so-called targeted and non-targeted CRTs were entirely unrelated by any demand or supply substitution, Dr. Leitzinger's analysis would likely produce a very high estimate of price correlation simply because prices of most CRTs, for example, were declining due to common market forces such as buyers switching to LCDs and declining manufacturing costs, even if the extent to which these market forces affected CRTs' prices differed across various categories of CRTs.

35. Moreover, Dr. Leitzinger's price correlation analysis masks considerable heterogeneity in CRT price dynamics because the analysis is focused only on *average* CRT prices, aggregated across many different CRTs within broad categories. An analysis using disaggregated CRT price data reveals that the alleged target prices identified by Dr. Leitzinger are very poor predictors of actual sales prices of non-targeted CRTs. This result is wholly inconsistent with Dr. Leitzinger's contention that the alleged target prices broadly impacted sales prices of non-targeted CRTs.

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C. Pass-through of CRT Costs to Finished Product Prices Was Complex and Differentiated.

36. The proposed DPP class includes purchasers of CRTs as well as purchasers of CRT finished products. Even assuming *arguendo* that the alleged CRT cartel impacted prices paid by direct purchasers of most or all CRTs during the class period, it likely would have broadly impacted prices paid by class members for all or nearly all *finished products* only if the increase in CRT prices flowed through to finished products purchased by class members in a uniformly positive manner.

37. As explained above, certain categories of CRT finished products faced stiffer and earlier competition from LCDs and plasma technologies. As such, manufacturers may not have had the ability to pass-through increases in CRT prices in some categories of finished products. More generally, economic theory shows that not all finished product prices would necessarily have been elevated and some prices may even have fallen if the alleged cartel was able to elevate prices of all CRTs. Consistent with this view, the data on record show that finished product manufacturers did not always pass-through even widespread changes in CRT costs, which indicates that the link between finished product prices and CRT costs was complex and non-uniform.

38. Ignoring the variation in pass-through rates apparent in the available data, Dr. Leitzinger provides an estimate of the average pass-through rate of CRT costs to finished product prices – averaged across all finished products, manufacturers, and time periods. However, Dr. Leitzinger's pass-through analysis is fundamentally flawed because his estimate of the average pass-through rate relies in large part on comparing the prices and costs of different CRT finished products. Thus, Dr. Leitzinger's analysis would compare, for example, small TVs with few premium features and large TVs with more premium features and would attribute the difference in their prices to the fact that the larger, full-featured TVs had higher-cost CRTs, ignoring the fact that the higher prices of the larger TVs likely were due in part to the greater willingness of customers to pay for such features. Correcting for this error reveals that the average pass-through rates for TVs – when considered separately from monitors – are not statistically distinguishable from zero.

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D. Dr. Leitzinger's CRT Overcharge Analysis Shows No Impact of the Alleged Cartel on the Prices of Several Major CRT Categories.

39. In his report, Dr. Leitzinger proposes comparing CRT prices during the alleged cartel period with prices before and after the cartel period in order to estimate putative overcharges for CRTs. At his deposition, Dr. Leitzinger testified that he relies on his analysis of alleged CRT overcharges to opine that the alleged cartel had class-wide impact.¹¹ As such, Dr. Leitzinger's CRT overcharge analysis is relevant for assessing impact as well as damages. However, Dr. Leitzinger's regression model of CRT overcharges is unreliable because it fails to capture material changes in market conditions during the relevant periods. Moreover, it pools together widely disparate types of CRTs. Dr. Leitzinger makes no effort to determine if his estimated average overcharge is reasonably representative of overcharges paid by all or most DPP class members for disparate categories of CRTs, nor does he attempt to estimate overcharges for CRTs sold in North America.

40. In fact, Dr. Leitzinger's own data and overcharge analysis demonstrate that average prices of many CRTs during the conspiracy periods were not higher than their average prices during the benchmark period, i.e., there likely were no overcharges for many CRTs. For example, when I employ Dr. Leitzinger's data and overcharge model to estimate overcharges for CPTs and CDTs separately instead of pooling them together as he does, I find that his overcharge regression model implies that average CDT prices were not elevated during the cartel period relative to the benchmark non-cartel period. Even among CPTs, not all segments had overcharges associated with them.

41. Furthermore, when Dr. Leitzinger's overcharge model is applied only to CRTs sold in North America, it estimates *negative* overcharges for CDTs, zero overcharges for CPTs and zero overcharges for all CRTs (in the aggregate).

42. In sum, Dr. Leitzinger is mistaken in his claim that his damages model proves the feasibility of a formulaic approach to reliably estimating damages. If anything, his data

¹¹ Leitzinger Deposition, p. 190.

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and his analysis demonstrate the need for a disaggregated analysis of damages and impact given the non-uniform impact (if any) of the alleged cartel. This is not surprising given the extremely broad class claimed by plaintiffs, a class that includes many and heterogeneous products and regions.

III. No Evidence of Uniform, Effective and Sustained Collusion

A. Record Evidence and Economic Logic Indicate that the Alleged Cartel Was Unlikely to Have Broadly Elevated Prices of CRTs (If at All).

Economic Theory Suggests that, Contrary to Dr. Leitzinger's View, the CRT Cartel Was Potentially Ineffective at Raising Prices of All or Nearly All CRTs across the Proposed Class.

43. Dr. Leitzinger contends that the alleged conspirators successfully elevated the prices for *all* or most CRTs sold during the nearly thirteen-year proposed class period in part by agreeing to a set of “target prices.”¹²

44. However, economic theory has established that cartels in industries with certain features and conduct are less likely to be effective than cartels in industries without those features. Such characteristics include opaque pricing (i.e., prices are not entirely transparent to suppliers)¹³ and differing degrees of vertical integration across alleged cartel members.¹⁴ These features are found in the CRT industry during the relevant period.

45. Transparency of pricing matters for cartel stability because a cartel cannot succeed if cartel members can readily gain sales by cheating on the agreement and undercutting cartel prices without inviting retaliation. Cheating is more likely to be detected and

¹² Leitzinger Report, §6.

¹³ See, e.g., Church, J., & Ware, R. (2000). *Industrial Organization: A Strategic Approach*. McGraw-Hill. p. 340.

¹⁴ See, e.g., Carlton, D.W., & Perloff, J. M. (1999). *Modern Industrial Organization, 3rd edition*. Addison-Wesley. p.138.

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deterred if each member of the alleged cartel were able to observe prices other cartel members charged their customers. If so, members would be able to detect whether cartel participants are, in fact, complying with the agreed-upon target prices. Conversely, if prices are opaque, then cartel members are unlikely to be able to detect cheating in a timely manner. Opaque pricing is especially likely to destabilize a cartel if the market experiences frequent changes in demand, cost and technology because it would be difficult for cartel members to separate price changes and shifts in market shares due to such changes in market conditions from price changes and shifts in market shares due to cheating.¹⁵

46. As discussed in Section IV, CRTs are extremely heterogeneous products, and CRT prices depend materially on a variety of CRT features. Prices were typically negotiated with individual customers, and it was not the industry practice to generate public list prices.¹⁶ Moreover, as explained below in Section III.B of this report, the price differences between larger and smaller CPTs differed across manufacturers and over time. More generally, pricing complexity and diversity have been cited in testimony by executives from CRT manufacturers as reasons why manufacturers were unable to reliably assess prices of other CRT manufacturers.¹⁷

47. Opaque and complex pricing are all the more likely to have eroded the effectiveness of the alleged cartel because there were major changes in the industry during the class

¹⁵ Carlton, D.W., & Perloff, J. M. (1999). *Modern Industrial Organization*, 3rd edition. Addison-Wesley. p. 137; Motta, M. (2004). *Competition Policy: Theory and Practice*. Cambridge University Press, p. 150; Scherer, F.M. (1980). *Industrial Market Structure and Economic Performance*, 2nd edition. Houghton Mifflin. pp. 205-206; Church, J., & Ware, R. (2000). *Industrial Organization: A Strategic Approach*. McGraw-Hill. p. 341.

¹⁶ Deposition of Jay Heinecke, July 31, 2012 (“Heinecke (TAEC) Deposition”), pp. 165-166. See also, Deposition of Yasuhiko Kawashima, July 18, 2012 (“Kawashima (HDL) Deposition”), p. 36; Deposition of L. Thomas Heiser, July 3, 2012 (“Heiser (HEDUS) Deposition”), p. 101.

¹⁷ See, for example, Deposition of Jaein Lee, June 6-7, 2012, (“Lee (SDI) Deposition”), p. 108. See also Deposition of Yoshiaki Uchiyama (TACP), August 1, 2012 (“Uchiyama (TACP) Deposition”), pp. 51-52.

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period such as the growing competitive presence of LCD and plasma technologies.¹⁸

Shifts in CRT market shares and price changes due to technology disruptions would be difficult to separate from share shifts due to cheating when prices are hard to know.

48. In addition to complex and opaque prices, the differing degrees of vertical integration by CRT suppliers also make it unlikely that the alleged cartel was consistently effective in elevating prices. During the class period, several large CRT manufacturers were vertically integrated into manufacturing finished CRT products (i.e., TVs and monitors) while others were not. Specifically, Hitachi was vertically integrated throughout the class period, while Chunghwa, LPD, and SDI were not. Panasonic and Toshiba were each vertically integrated through 2003, at which point they formed a new entity called MTPD that acquired all of Panasonic's and Toshiba's former CRT manufacturing capacity,¹⁹ with Panasonic retaining a controlling stake in MTPD.²⁰ Philips and LG were each vertically integrated through July 2001, at which point they each divested their entire CRT manufacturing businesses to LPD – a newly formed independent joint venture.

49. Economists have identified such asymmetries in vertical integration as a contributor to cartel instability.²¹ The price paid by a finished product manufacturer to an affiliated

¹⁸ The shift from analog TV to digital TV in the U.S. was another notable change in the CRT marketplace during the class period. In particular, widescreen and high definition digital CPTs differed from analog CPTs and from CPTs used to display standard definition digital broadcasts. (United States International Trade Commission. (2000). *Color Picture Tubes from Canada, Japan, Korea, and Singapore, Investigations Nos. 731-TA-367-370 (Review), Determinations and Views of the Commission*. USITC Publication No 3291. pp. 21-22.)

¹⁹ Toshiba's Himeji factory remained in operation for approximately a year after April 2003. During this year, the factory took orders from MTPD. (Deposition of Koji Kurosawa, July 30, 2012 ("Kurosawa (Toshiba Corp.) Deposition"), pp. 64-65.)

²⁰ Panasonic initially owned 65% of MTPD and appointed a majority of the company's board members. (Kurosawa (Toshiba Corp.) Deposition, p. 154.) In 2007, Panasonic acquired Toshiba's entire 35% ownership stake. (Deposition of Takashi Nakano, July 13, 2012 ("Nakano (Panasonic, MTPD) Deposition"), p. 33.)

²¹ Carlton, D.W., & Perloff, J. M. (1999). *Modern Industrial Organization*, 3rd edition. Addison-Wesley. p. 138. To be clear, I do not mean to imply that successful cartelization is impossible in the presence of asymmetries in vertical integration, merely that economists have identified such asymmetries as a contributor to cartel instability.

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CRT manufacturer (the “transfer” price) is likely to be hard to detect by other firms, and the output incentives of a vertically integrated supplier of finished products are apt to differ significantly from those of non-integrated upstream and downstream producers.²²

50. Although the CRT industry contains features that likely eroded the effectiveness of the alleged cartel, it is also true that the CRT industry is characterized by other factors that economists have identified as facilitating collusion (for example, high entry barriers due to substantial sunk costs of setting up CRT plants²³). Thus, whether or not the CRT cartel alleged by the DPP class was consistently effective in elevating prices of all (or most) products and customers during the nearly thirteen-year class period is ultimately an empirical question that needs to be resolved by examining the evidence on record.

Documentary Evidence Suggests that, Contrary to Dr. Leitzinger’s View, the Cartel Was, at a Minimum, Not Always Effective in Raising Prices across the Proposed Class.

51. In fact, the evidence strongly indicates that the alleged cartel was often not effective in elevating prices. For example, many of the documents cited by Dr. Leitzinger as evidence that the alleged cartel members met in order to set “target prices” refer to SDI (which was previously known as Samsung Display Devices (“SDD”)) undercutting prices of other alleged cartel members. One instance of this is found in a May 1998 Chunghwa document cited by Dr. Leitzinger about a meeting between alleged cartel members. The document notes that “Mr. Moon [Orion] claimed that he believed that SDD had strong

²² In particular, whereas unaffiliated finished-product manufacturers could be expected to use favorable pricing offered by one CRT manufacturer to try to convince other CRT manufacturers to offer even lower prices, an integrated finished-product manufacturer would not reveal that its upstream affiliate had cheated on the cartel agreement by lowering its transfer price.

²³ The construction of a CRT manufacturing plant required an extensive amount of time, and a high initial capital investment, and, once built, could not readily be used for uses other than CRT manufacturing. Some estimates state that a CRT facility required approximately one year to build and that construction costs ranged from \$70 to \$332 million. (Deposition of Nobuhiko Kobayashi, July 17, 2012 (“Kobayashi (Hitachi) Deposition”), p. 93; Deposition of Tatsuo Tobinaga, July 16-17, 2012 (“Tobinaga (Panasonic, MTPD) Deposition”), pp. 146-147, 151-152; and United States International Trade Commission *in the Matter of: Color Picture Tube from Canada, Japan, Korea, and Singapore*, *supra* note 18, p. 18.

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ambitions to expand M/S [market share], and that its major strategy is to ‘kill the competing makers.’ So he was suspicious about SDD's attitude toward holding prices.”²⁴ Consistent with this, SDI's share of global CRT sales increased sharply during portions of the class period. For example, between 2000 and 2005, SDI's share of worldwide CDTs sold increased from 25% to 42% and its share of CPTs sold increased from 18% to 22%. During that time, SDI's share of worldwide CDT revenue increased from 24% to 42% and its share of CPT revenue increased from 12% to 24%.²⁵ Shifting market shares among alleged conspirators is consistent with the view that the alleged cartel was not always stable or effective.²⁶

52. In addition to the conduct of SDI, qualitative evidence indicating that the cartel alleged by plaintiffs was less than consistently effective can be found in the documents cited by Dr. Leitzinger that relate to meetings among alleged cartel members. Many of these documents indicate that participants found CRT pricing by other suppliers to be

²⁴ Customer Contact Report, CHU00028952-CHU00028954, May 18, 1998. See also: Visitation Report, CHU00031113-CHU00031114 at CHU00031113, March 22, 2001; Customer Contact Report, CHU00028763-CHU00028767 at CHU00028763, February 24, 1997; CPT Sales Division Customer Contact Report, CHU00028599-CHU00028600 at CHU00028599, October 4, 1999; Visitation Report, CHU00028707-CHU00028710 at CHU00028707, July 18, 1997; Visitation Report, CHU00028713-CHU00028714, July 2, 1997; CDT Market Report, CHU00031249-CHU00031252 at CHU00031249, May 26, 2004; Visitation Report, CHU00036392-CHU00036393 at CHU00036392, January 18, 2002; Visitation Report, CHU00036394-CHU00036395 at CHU00036395, February 22, 2002.

²⁵ SDI shares are taken from the following documents: *Flat Panel Display Applications: Trends and Forecasts*. (2001). Fuji Chimera Research Institute, translated by InterLingua; *Flat Panel Display Applications: Trends and Forecasts*. (2007). Fuji Chimera Research Institute, translated by InterLingua.

²⁶ Economists have recognized that shifting shares among alleged cartel members is a symptom of an unstable cartel. (See, e.g., Grout, P., & Sonderegger, S. (2005). Predicting Cartels. *Office of Fair Trading*; Harrington, J. E. (2007). Detecting Cartels. In P. Buccirossi (Eds.), *Advances in the Economics of Competition Law*. MIT Press.) Nevertheless, Dr. Leitzinger testified at his deposition that he had not “analyzed shares among the different producers of CRTs and how they may have changed, one versus the other, over the period.” Leitzinger Deposition, p. 130.

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opaque and that alleged cartel members often engaged in pricing conduct that deviated from what Dr. Leitzinger refers to as “target prices” set by the putative cartel.²⁷

Actual CRT Prices Frequently Deviated from the Alleged Cartel Target Prices.

53. The documentary evidence of breakdowns in the alleged cartel is supported by data on actual CRT prices. Specifically, I have compared actual CRT prices charged by the alleged cartel members to the “target prices” that Dr. Leitzinger alleges were set by these firms, and I find that actual prices frequently deviated from the alleged target prices. In particular, based on Dr. Leitzinger’s data on actual CRT prices and the alleged target prices, only 29% of the CDTs and 42% of the CPTs for which Dr. Leitzinger identified an alleged target price during the class period were priced within 5% of the alleged applicable target price.

54. Moreover, the data are consistent with pervasive cheating on the alleged target prices. Specifically, 76% of CDT unit sales and 56% of CPT unit sales in CRT categories for which Dr. Leitzinger identified an alleged applicable target price during the class period were priced below that target price.²⁸ Because Dr. Leitzinger has not presented any but-for prices for particular CRTs, he has provided no basis that would allow a fact-finder to

²⁷ See, e.g., CDT Market Report, CHU00031249-CHU00031252 at CHU00031249, May 26, 2004; Visitation Report, CHU00031142-CHU00031147 at CHU00031144, June 27, 2001; Visitation Report, CHU00030670-CHU00030674 at CHU00030673, October 1, 1998; Customer Contact Report, CHU00028763-CHU00028767 at CHU00028763, February 24, 1997. See also, CPT Sales Division Customer Contact Report, CHU00028599-CHU00028600 at CHU00028599, October 4, 1999; Visitation Report, CHU00028707-CHU00028710 at CHU00028707, July 18, 1997; Visitation Report, CHU00030809-CHU00030814 at CHU00030809, July 23, 1999; Visitation Report, CHU00036394-CHU00036395 at CHU00036395, February 22, 2002; Report on the Results of the Industry Working Level Meeting on July 28, SDCRT-0086662-SDCRT-0086664 at SDCRT- 0086662, July 29, 1999.

²⁸ These figures are conservative estimates of the share of CDT and CPT sales prices below the alleged applicable target price because Dr. Leitzinger’s target price data represent the minimum target prices he identified for a given manufacturer, application, size, finish, and quarter. (Leitzinger Report, ¶ 39 (“Where the target involved a range of prices, the minimum price was recorded.”)) Thus, an actual price for a specific CRT model could have been above the minimum target price for that manufacturer, application, size, finish, and quarter, but still been below the alleged target price that was actually applicable to that model.

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ascertain which, if any, of the substantial majority of CRTs priced below the alleged applicable target prices were priced above the but-for price. Of particular importance for assessing issues pertaining to class certification is that some of the CRTs priced below the alleged applicable target price may have been above the corresponding but-for price (*i.e.*, they may have been impacted by the alleged cartel) while others may not. In fact, as discussed in Section VI below, when Dr. Leitzinger's overcharge model is re-run separately for different categories of CRTs (using the same data that he used), the model produces overcharge estimates for CDTs and for small CPTs that are not statistically different from zero. Thus, it is possible that there was no impact on entire segments of CRT sales.

A Properly Specified Econometric Model Shows Little or No Connection between the Alleged Cartel Target Prices and Actual Prices.

55. As the preceding analysis shows, the alleged cartel members frequently deviated from the alleged applicable target prices, suggesting that the target prices had, at most, a non-uniform impact on actual CRT prices. In order to further examine this issue, I have analyzed whether changes in actual prices tended to track changes in target prices.

56. For example, based on a Chunghwa document dated August 21, 1998, Dr. Leitzinger infers that several alleged cartel members attended the meeting referenced in this document and agreed to set a target price for 15-inch CDTs of \$60 that would be effective on August 1998.²⁹ This represents an increase of \$5 over the previous target price in May 1998 identified by Dr. Leitzinger for the same product. If the alleged cartel members adhered to the alleged target prices when setting their actual sales prices, then their actual 15-inch CDT sales prices would have increased by an amount approximately similar to the alleged increase in the target price of \$5 during the relevant period.

Conversely, if alleged cartel members rarely adhered to the alleged target prices, then we

²⁹ Sales Department Customer Contact Report, August 21 1998, CHU00028385-6 at CHU00028386; Summarized Meeting Report, June 4 1998, CHU00028638.01E-.02E at CHU00028638.01E.

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should observe that changes in actual sales prices of 15-inch CDT models were inconsistent with changes in the target prices identified by Dr. Leitzinger.

57. To test this prediction of cartel effectiveness more broadly for the entire set of target prices identified by Dr. Leitzinger, I have employed an econometric model to estimate how well quarter-to-quarter changes in actual prices of individual CRT models are predicted by changes in the corresponding target prices identified by Dr. Leitzinger.^{30, 31}

If the alleged cartel members closely adhered to the putative target prices, then changes in target prices should reliably predict changes in actual prices.³² In fact, the relevant data

³⁰ Dr. Leitzinger partitions CRT sales by “panel” and quarter. He defines a “panel” as all sales to the same customer of models that share the same manufacturer, application (CDT or CPT), size, and finish (bare or ITC). He then derives an average target price for each panel-quarter based on his reading of the case record, which he applies to all customers in the panel (Leitzinger Report, Figure 7, fn. 2.) For each model and customer in a given panel, I compared changes in the actual quarterly prices charged to a given customer for a given model to changes in the alleged average target price for that panel. For example, I compared the change in the actual quarterly price paid by Funai (a customer) for a particular SDI 14-inch bare CPT model (A14GR00207) between the first quarter and second quarter of 2003 with the change in the average alleged target price for all SDI 14-inch bare CPT models during the same time period.

³¹ Because there may be no information on actual and/or target prices for a given quarter, my staff (under my instructions) looked for quarters in which Dr. Leitzinger identified alleged target prices and allegedly applicable actual prices and measured the average quarterly actual and target price changes between such quarters. For example, if a model was sold to a given customer in Q1 2003, Q2 2003, and Q3 2003, but Dr. Leitzinger only identifies a target price for the corresponding panel in Q1 2003 and Q3 2003, then the actual and target price change for Q3 2003 would both be based on the average quarterly price change between Q1 2003 and Q3 2003.

³² I compare actual and target price *changes* rather than *levels* because target price levels are likely to be somewhat predictive of actual price levels even if the alleged cartel members completely ignored the alleged target prices. For example, all else equal, both target and actual prices for a 30-inch CPT would presumably be higher than for a 14-inch CPT regardless of whether the alleged cartel members ever adhered to the target prices. Thus, actual and target price levels would be highly correlated regardless of the extent to which alleged cartel members adhered to the alleged target prices. Additionally, declining production costs could be expected to reduce both actual and target prices regardless of whether the alleged cartel members ever adhered to the target prices. Comparing changes in actual and target prices mitigates these biases in two ways. First, price *changes* were less correlated with product characteristics than were price *levels*. However, even an analysis of price changes is conservative in this regard because, as discussed in Section IV below, quarter-to-quarter price changes as well as long term price

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demonstrate that quarterly changes in *target* prices are extremely poor predictors of changes in *actual* prices. Specifically, the R-squared statistic associated with my econometric model is 0.033. (See Exhibit 1, row 1.) The R-squared statistic is a standard metric ranging from 0 to 1 that measures the share of variation in the dependent variable in the model (in this case, changes in actual prices) that is explained by the independent variable(s) (changes in the alleged target prices).³³ In the context of this analysis, an R-squared statistic of 0.033 indicates that changes in the target prices identified by Dr. Leitzinger explain only 3.3% of the variation in changes in the actual prices for corresponding CRTs. That is, the model demonstrates that changes in the alleged target prices are extremely poor predictors of changes in actual prices.^{34, 35}

58. Moreover, target price changes do an extremely poor job of predicting changes in actual prices even on average. Specifically, as noted in Exhibit 1, row 1, the estimated

(... footnote continued)

trends were different across different categories of CRTs, meaning that some correlation across actual and target price changes could be expected regardless of the extent to which the alleged cartel members adhered to the alleged target prices. Second, although changes in market conditions would be expected to have an exogenous effect on both actual and target price *changes*, this effect should at least be limited to contemporaneous changes in market conditions. Conversely, changes in market conditions would be expected to have a cumulative effect over time on actual and target price *levels*. Thus, a comparison of actual and target price changes at least mitigates the impact of changes in market conditions relative to an analysis of the relationship between actual and target price levels. As discussed in the notes to Exhibit 1, I conducted several robustness checks on this regression, one of which was to include changes in the market variables that Dr. Leitzinger included in the analysis presented in Figure 7 of his report. Including these variables does not materially affect my estimates of the low ability of changes in target prices to predict changes in actual prices. (See Exhibit 1, row 4.)

³³ Gujarati, D. N. (1995). *Basic Econometrics*, 3rd edition. McGraw Hill. pp. 74-78.

³⁴ See Exhibit 1 for further details about the data used and model specification. I have conducted several robustness checks on this regression (described in the notes to Exhibit 1) and none of the variations yield an R-squared above 0.197, which implies that changes in target prices explain very little of the changes in actual prices.

³⁵ Including past changes in target prices in my regressions to allow for the possibility that adherence to the alleged target prices did not occur immediately does not materially affect my estimates of the low ability of changes in target prices to predict changes in actual prices. (See Exhibit 1, row 6.)

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coefficient on the target price change in my model is 0.157, which implies that a 5% increase in the target price identified by Dr. Leitzinger is, on average, associated with only a 0.78% increase in the actual price during the same quarter. Moreover, even this slight correlation does not imply causation (i.e., the change in actual price may not be due to the change in target price) since actual and target price changes are both likely to have been affected in the same direction by common market factors, generating some positive correlation between the two series, irrespective of whether the alleged cartel members ever adhered to the alleged target prices.

59. The very low R-squared and estimated coefficient on changes in the target price in the regression analysis described above demonstrate that there was an extremely weak relationship between changes in the target price and changes in the actual price.

Moreover, these regression results are based on 5,315 observations (see Exhibit 1, row 1), which is a substantial sample that is larger than the samples that Dr. Leitzinger relied upon in some of the statistical analyses that he presents in his report.³⁶ I therefore conclude that the regression results demonstrate in a robust manner that the alleged cartel was far from consistently effective (if at all), which is consistent with the documents on record and cited by Dr. Leitzinger.³⁷

³⁶ See, e.g., Leitzinger Report, Figures 7, 9, and 13.

³⁷ While the CRT prices were negotiated in different currencies, the degree of adherence to the purported target prices is most logically measured using U.S. dollars. This conclusion follows naturally from Dr. Leitzinger's allegation that the alleged cartel was orchestrated through the use of target prices that were denominated in U.S. dollars. In fact, he assumes that there was only a single global target price (expressed in U.S. dollars) for any given product (or set of products) at a particular point in time – not different target prices depending on the region of sale or the currency in which a particular price was negotiated. If the alleged cartel members closely or uniformly adhered to the alleged U.S. dollar-denominated (“USD”) target prices, then changes in USD target prices should reliably predict changes in USD actual prices. Nevertheless, for further confirmation of my results, I added independent variables that control for changes in the exchange rate between the currency in which prices were negotiated (“negotiated-price currency”) and U.S. dollars to my econometric analysis of changes in USD actual prices and USD target prices. These variables allow the model to account for any impact that changes in the exchange rate between the negotiated-price currency and U.S. dollars had on USD actual price changes. My qualitative results remain unchanged. Specifically, the R-squared statistic

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60. The inability of changes in the target prices identified by Dr. Leitzinger to predict changes in actual prices is further illustrated in Exhibit 2. In this exhibit, the vertical axis represents quarterly changes in *actual* sales prices of CRT models and the horizontal axis represents changes in the corresponding alleged *target* prices during the same quarter.³⁸

61. If actual prices followed target prices closely, I would expect most observations to be located close to the 45-degree line (which is traced in the chart) indicating that an actual price change was equal to the alleged applicable target price change. However, although most of the data points are located in the lower left quadrant of the chart – consistent with the general downward trend in CRT prices over the course of the class period – the points are widely diffuse rather than clustered around the 45-degree line, which demonstrates that changes in actual prices for CRTs differed widely from changes in the alleged applicable target prices. In fact, as Exhibit 2 makes clear, actual prices often moved in opposite directions from the alleged applicable target price. In particular, in 45% of the instances in which an alleged target price increased, the corresponding actual prices decreased.

62. Part of the lack of consistent adherence to target prices identified by Dr. Leitzinger was likely due to the fact that during the class period some alleged cartel members were vertically integrated. As explained above, varying degrees of vertical integration among

(... footnote continued)

associated with this econometric model is 0.111 (See Exhibit 1, row 5.), indicating that changes in the target prices identified by Dr. Leitzinger and changes in the exchange rates between the negotiated-price currency and U.S. dollars together explain only 11.1% of the variation in changes in CRT actual USD prices. Additionally, the estimated coefficient on the target price change in this model is 0.144, which is lower than in the model without controls for exchange rate movements, and implies that a 5 percentage point increase in the target price identified by Dr. Leitzinger is, on average, associated with only a 0.72 percentage point increase in the actual price during the same time period. Thus, even after controlling for the influence of exchange rate movements on USD actual price changes, the results of my econometric model demonstrate that the alleged cartel was far from uniformly effective (if at all).

³⁸ More precisely, the vertical axis measures the change in the actual average sales price of a particular model of CRT sold to a particular customer by a particular manufacturer in a particular quarter. The horizontal axis measures the change in the alleged target price for the corresponding manufacturer, application, size, and finish in the same quarter.

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alleged cartel members can potentially erode the effectiveness of price cartels. The transfer price paid by an affiliated downstream finished-product manufacturer to an upstream CRT manufacturer is likely to be opaque to other CRT manufacturers, thus enabling integrated firms to deviate from cartel agreements with a relatively lower risk of detection and penalties for such cheating.

63. Consistent with this potential for cartel erosion, sales data on record indicate that prices of *transfer* CRT sales were even less likely to follow target prices identified by Dr. Leitzinger than prices of *merchant* CRT sales. Specifically, I implemented the same econometric model as the one described above (i.e., where I assess how well quarter-to-quarter changes in actual prices are predicted by target price changes), but now I do so separately for merchant and transfer CRT prices. Put differently, I inquire whether there is any difference between (a) the extent to which changes in *transfer* CRT prices are correlated with target price changes and (b) the extent to which changes in *merchant* CRT prices are correlated with target price changes.

64. If vertically integrated firms deviated more from the target prices identified by Dr. Leitzinger when they sold CRTs to downstream affiliates than when they sold to unaffiliated customers, then we would observe a smaller correlation between transfer prices and target prices than between merchant prices and target prices. I find that this indeed is the case. Specifically, when I implement the model for merchant CRT sales, the model is associated with a very low R-squared of 0.036, implying that only 3.6% of the variation in actual price changes can be explained by target price changes (and even then correlation is not tantamount to causation). The estimated coefficient on the change in target price is 0.168, which is small – implying that a 5% increase in the target price is associated with only a 0.84% increase in the actual price – but statistically different from zero.³⁹ (See Exhibit 1.)

65. When I implement the same model for *transfer* CRT sales, the associated R-squared is an even lower 0.003. The estimated coefficient on the change in target price is 0.036 –

³⁹ I test for significance using a two-tailed t-test at the 95% level.

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which implies that a 5% increase in the target price is associated with only a 0.18% increase in the actual price – and this estimate is not statistically different from zero. Thus, the data do not support the existence of any positive relationship between changes in the alleged target prices and changes in actual *transfer* CRT prices. Similarly, the data do not support the existence of a positive relationship of meaningful size between changes in the alleged target prices and changes in actual *merchant* CRT prices.

66. In sum, I conclude that the evidence indicates that the target prices set by the alleged cartel were either ineffective or at least were not frequently effective in elevating sales prices of CRTs. Thus, the data are inconsistent with Dr. Leitzinger’s claim that the alleged target prices constituted a mechanism by which the alleged cartel effected common class-wide impact. Consequently, individualized inquiries would be required to establish whether the alleged cartel was effective at elevating prices for specific CRT models to specific customers at specific times.

B. Dr. Leitzinger’s Analyses of Actual and Target Price Data Do Not Establish Class-wide Impact.

67. Dr. Leitzinger reviews the same data that I discussed in the previous section but reaches a different conclusion. In particular, Dr. Leitzinger contends that the cartel agreed to set “target” prices that “extended directly to CRTs representing the vast majority of total sales.”⁴⁰ He also presents a regression analysis that he purports shows that these target prices “had a demonstrable effect on actual prices paid.”⁴¹ Lastly, Dr. Leitzinger presents an hedonic regression analysis that he claims is evidence that the alleged cartel had a class-wide impact on CRT prices.⁴²

68. However, as explained in greater detail in the rest of this section, Dr. Leitzinger’s analyses are not valid common evidence of class-wide impact for several reasons. First, the alleged target prices that Dr. Leitzinger identified were at most applicable to a small

⁴⁰ Leitzinger Report, ¶¶ 6 and 40.

⁴¹ Leitzinger Report, ¶¶ 6 and 43-44.

⁴² Leitzinger Report, ¶ 38.

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fraction of CRT sales. Second, Dr. Leitzinger's analysis of actual and target prices (his "actual-target regression analysis") at most demonstrates a positive relationship between actual and target prices; it does not demonstrate that the alleged target prices had an impact on actual CRT prices. Third, his actual-target regression analysis estimates only the *average* relationship between actual and target prices; it is silent about whether there was a class-wide relationship between actual and target prices (and is also effectively silent about CDTs). Fourth, Dr. Leitzinger's "actual-target regression" analysis has methodological flaws that cause him to overstate even the average relationship between actual prices and target prices. Last, even if the product characteristics in Dr. Leitzinger's hedonic regression analysis could perfectly explain all of the variation in actual prices, this still would provide no information about whether the alleged cartel elevated prices of all or most CRTs.

The Alleged Target Prices that Dr. Leitzinger Identified Were at Most Applicable to a Small Fraction of CRT Sales

69. Dr. Leitzinger asserts that "target prices" involved a range of CRT types and sizes that accounted for the vast majority of CRT shipments. Specifically he writes, "[T]he share of shipments represented by the targeted CRTs was 90 percent for CPTs and 99 percent for CDTs... That result, by itself, would go a long way towards establishing the existence of broad impact on the part of the alleged conspiracy."⁴³

70. However, Dr. Leitzinger's conclusion does not follow from the figures he reports because the figures do not show that target prices existed for 90-plus percent of CRT sales. Rather, Dr. Leitzinger obtained such high shares by *counting every CRT sold during the entire class period* for a particular application (CDT or CPT) and size ("category") if he identified even one alleged target price for one manufacturer of one particular variety of that category of CRT in one quarter during the class period. For example, Dr. Leitzinger includes all sales of 17-inch CDTs, which comprised 50% of all

⁴³ Leitzinger Report, ¶ 40. Dr. Leitzinger alleged that the targeted CRTs represented 94% of all CRT shipments during the class period. *Id.*

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CDTs sold between 1995 and 2007, when deriving his claim that the targeted CDTs accounted for 99% of CDT shipments.⁴⁴ However, Dr. Leitzinger identified alleged target prices that were for 17-inch CDTs in only six of the fifty-two quarters comprising the class period. Moreover, based on Dr. Leitzinger's data, these alleged target prices corresponded to only 7.3% of the 17-inch CDTs sold during the class period.

71. A similar pattern emerges for most of the other "targeted" CRT categories included in Figure 6 of Dr. Leitzinger's report. In particular, for eight of the twelve CRT categories that Dr. Leitzinger refers to as "targeted," he identified alleged target prices in only six or fewer of the fifty-two quarters during the class period. As a consequence, Dr. Leitzinger identified allegedly applicable target prices for less than 10% of the shipments in nine of the twelve CRT categories (and none of the CDT categories) that Dr. Leitzinger describes as "targeted" in Figure 6 of his report. In all, CRT sales for which Dr. Leitzinger has not identified applicable target prices collectively accounted for 83% of CRTs sold during the class period. Specifically, Dr. Leitzinger identified allegedly applicable target prices for at most only 6% of CDT shipments and 24% of CPT shipments during the class period.⁴⁵ This is illustrated graphically in Exhibits 3A and 3B.

Dr. Leitzinger's Analysis of Actual and Target Prices at Most Demonstrates a Positive Relationship between Actual and Target Prices; It Does Not Demonstrate that the Alleged Target Prices Had an Impact on Actual CRT Prices.

72. Dr. Leitzinger concludes that his actual-target regression analysis "reveal[s] a positive relationship between target prices and actual prices."⁴⁶ However, even if there were "a

⁴⁴ Leitzinger Report, Figure 6.

⁴⁵ Even these figures overstate the share of sales for which Dr. Leitzinger identified alleged target prices because they include sales of CRTs that had a different shape, resolution, frequency, safety standards, mask type, neck diameter, and/or shipping terms from those specified in the alleged applicable target price. The shares would undoubtedly be lower if the calculation were limited to sales and alleged target prices that shared these characteristics, although it is not possible to measure how much lower given the data available.

⁴⁶ Leitzinger Report, ¶ 44.

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positive relationship between target prices and actual prices,” it does not necessarily follow that the alleged target prices had an impact on actual CRT prices, for at least three reasons. First, to the extent that the control variables that Dr. Leitzinger included in his regression do not capture all of the market forces that affected both actual and target prices, one would expect to observe a positive relationship between actual and target prices regardless of the extent to which target prices influence actual prices. Second, there is evidence in the documents cited by Dr. Leitzinger of the alleged target prices being set at least partly based on past actual prices, and in particular of target prices being lowered because alleged cartel members were already charging prices that were relatively low.⁴⁷ If target prices were set even partly based on actual prices, then one would expect to find a positive relationship, at least on average, between actual prices and target prices without target prices having any impact on actual prices. Finally, even if actual prices and target prices exhibit a positive relationship, it does not preclude the possibility that actual prices were frequently below the alleged applicable target prices. In fact, as discussed above, a majority of actual CRT prices were below the alleged target prices.

Dr. Leitzinger’s Actual-Target Regression Analysis Estimates Only the Average Relationship between Actual and Target Prices; It Is Silent about Whether There Was a Class-wide Relationship between Actual and Target Prices.

73. As an initial matter, Dr. Leitzinger’s “actual-target regression” analysis is essentially silent regarding the relationship between actual prices and target prices for CDTs, as only 3 of the 3,151 observations in his regression involve CDT sales. These three observations represent only 0.03% of all CDTs sold during the class period.⁴⁸ This is

⁴⁷ See, e.g., Visitation Report, July 18, 1997, CHU00028707; Customer Contact Report, November 21, 1997, CHU00028674.

⁴⁸ As explained in the previous section, Dr. Leitzinger identified allegedly applicable target prices for only 6% of CDT shipments during the class period. However, Dr. Leitzinger chose to include lagged variables in his regression specification, which in turn required limiting his data to the tiny fraction of CDT sales for which he identified alleged applicable target prices in consecutive quarters. Dr. Leitzinger’s regression analysis also contains no observations for sales by one of the two Defendants, Hitachi, or for any CRTs sold in 1995 to 1998, 2001, or 2007.

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particularly noteworthy, because, as discussed in Section VI below, when I employ Dr. Leitzinger's data and overcharge model separately for CPTs and CDTs instead of pooling them together as he does, I find that his CRT overcharge regression model implies that average CDT prices were not elevated during the alleged cartel period relative to the benchmark non-cartel period. At his deposition, Dr. Leitzinger did not know how many of the observations in his actual-target regression represented CDT sales,⁴⁹ but he conceded that, if the regression included only three observations related to CDT sales, the regression could not be used to show that there was a positive relationship between target prices and actual prices for CDTs.⁵⁰

74. Additionally, Dr. Leitzinger's actual-target regression analysis estimates only the *average* relationship between actual and target prices. That is, the regression produces a single set of coefficient estimates that purportedly reflect the average relationship between actual prices and target prices across all of the sales and alleged applicable target prices included in his analysis. This does not imply that the relationship between actual prices and target prices was the same across all CRTs. Thus, Dr. Leitzinger's regression analysis provides no guidance as to whether the relationship (much less impact) was positive across all or even most CRTs ultimately purchased by the proposed class. In Section III.A, I demonstrated that *changes* in the alleged target prices identified by Dr. Leitzinger were poor predictors of *changes* in the actual prices of the corresponding CRTs. Based on this evidence, I concluded that the alleged cartel was either ineffective or at least was not frequently effective.

75. Nevertheless, in order to further confirm my results, I have assessed whether the alleged target prices, expressed in the same functional form as in Dr. Leitzinger's

⁴⁹ Leitzinger Deposition, p. 135.

⁵⁰ Leitzinger Deposition, p. 136. ("If there were just three observations for CDTs, I don't think you could use this result as a -- to show, as a statistical matter, that there was a relationship between target prices and actual prices for CDTs, if one starts with testing the hypothesis that it might be different for CDTs than CPTs.")

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analysis,⁵¹ are reliable predictors of actual price *levels*. In fact, a statistical analysis of actual and target prices reveals that predicting the average actual price for a given panel and quarter based on the alleged applicable target price could be expected to be wrong by more than 5% at least 72% of the time, by more than 10% at least 48% of the time, and by more than 15% at least 30% of the time.^{52, 53} (See Exhibit 4.) Given that documents cited by Dr. Leitzinger indicate that price differences of even 5% can result in shifts in sales and shares,⁵⁴ the fact that predictions of actual prices based on observed target prices would frequently be wrong by more than 5%, 10%, and even 15% confirms my earlier finding that target prices are poor predictors of actual prices. If the alleged cartel members had adhered consistently to the alleged target prices, the target prices would be

⁵¹ Specifically, similar to Dr. Leitzinger, in the first stage of my analysis I regress the natural log of the quarterly average price for a given panel (defined by Dr. Leitzinger to include all CRT sales that share the same manufacturer, application, size, finish, and customer) and quarter on (i) the previous quarter's alleged target price for the corresponding manufacturer, application, size, and finish and (ii) the change in the alleged target price from the previous quarter to the current quarter for the corresponding manufacturer, application, size, and finish. Unlike Dr. Leitzinger's regression, I do not include the natural log of the average actual price from the previous quarter, any macroeconomic variables, or fixed effects because if the alleged cartel members adhered uniformly to the alleged target prices than the target prices alone should be able to accurately predict actual prices.

⁵² These results are statistically significant at the 95% confidence level. Specifically, they are based on the 5% lower bound on the variance of the prediction errors. The estimated probabilities of exceeding the 5%, 10%, and 15% prediction error thresholds are even higher if Dr. Leitzinger's methodological flaws described in the next sub-section are corrected. (See Exhibit 4.)

⁵³ The regression does produce a relatively high R-squared statistic. However, discussed in *supra* note 32, actual price levels and target price levels are both likely to be heavily influenced by product characteristics and market conditions. As a result, a regression of actual price levels on target price levels could produce a high R-squared statistic even if the alleged cartel members did not adhere at all to the alleged target prices. Nevertheless, my analysis shows that predictions of actual prices based on target prices would frequently be wrong by economically meaningful amounts.

⁵⁴ See, e.g., CPT Sales Division Customer Contact Report, October 4, 1999, CHU00028599; CDT Market Report, March 28, 2004, CHU00031249; and Customer Contact Report, February 2, 1997, CHU00028763.01E.

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able to predict actual prices with greater precision.⁵⁵ Thus, the evidence indicates that the alleged cartel members did not consistently adhere to the alleged target prices, if at all.

Dr. Leitzinger Overstates the Average Relationship between Actual Prices and Target Prices.

76. As discussed above, the regression presented in Figure 7 of Dr. Leitzinger's report represents an estimate of the *average* relationship between actual prices and target prices.⁵⁶ The analysis that Dr. Leitzinger presents in Figure 7 of his report suffers from two methodological flaws that inflate his estimate of the average relationship between actual prices and target prices. The first is that although Dr. Leitzinger attempts to identify and remove outlier observations from the CRT sales data before performing his analysis,⁵⁷ his methodology for doing so fails to remove even some fairly obvious outliers.

77. For example, according to the dataset on which Dr. Leitzinger's regression analysis is based, Sanyo purchased 48 29-inch bare CPTs from SDI in Q1 2003 for an average price of \$151.33. During this quarter, the alleged applicable target price identified by Dr. Leitzinger was \$107. Over each of the next four quarters, Sanyo purchased at least 5,000 29-inch bare CPTs from SDI at quarterly average prices that ranged from \$93.37 to \$99.29. During those quarters, the alleged applicable target price identified by Dr. Leitzinger ranged from \$95 to \$105, with the actual price remaining below the target price in each of the four quarters. Based on this information, it is clear that the price that

⁵⁵ This would be true even if the alleged cartel members deviated from the target prices but did so uniformly.

⁵⁶ As also noted above, even a positive average relationship between actual prices and target prices does not imply that target prices had an impact on actual prices, even on average.

⁵⁷ Specifically, Dr. Leitzinger drops all CRT sales for which (1) the units shipped is less than or equal to five, (2) the price is less than or equal to \$10 or greater than or equal to \$6,000, or (3) the price is more than three standard deviations away from the average price for all CRTs with the same application and size, where the mean and standard deviation are determined based on all CRTs sales of the corresponding application, size, and year.

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Sanyo reportedly paid in Q1 2003 was an outlier, perhaps owing to the small initial quantity that Sanyo purchased or some other factor.⁵⁸

78. Although such extreme outliers are rare in Dr. Leitzinger's regression dataset, they have important implications for his estimate of the average relationship between actual and target prices, specifically, on his estimate of the coefficient on the previous quarter's target price. Specifically, Dr. Leitzinger's regression interprets the pricing data described in the previous paragraph as demonstrating that the alleged target price from Q1 2003 (\$107) is a better predictor of the actual price in Q2 2003 (\$99.29) than is the \$151.33 actual price from Q1 2003, which results in a larger estimated coefficient on the previous quarter's target price. Dr. Leitzinger interprets this coefficient as reflecting any delayed response of the actual price to the target price,⁵⁹ even though in this case it is the fact that the Q1 2003 actual price was an outlier rather than the influence of the alleged target price that caused the actual price to decline in Q2 2003 (and subsequently remain below the alleged target price).

79. In order to identify and remove these types of outliers, I applied a filter based on the observed changes in average quarterly prices for a particular model sold to a particular customer.⁶⁰ Applying this filter results in the elimination of only 18 of the 3,151

⁵⁸ This pattern in Dr. Leitzinger's regression dataset does not result from the other methodological flaw in Dr. Leitzinger's analysis, which is that he combines prices for different CRT models for the same manufacturer, application, size, finish, customer and quarter into a single observation, which means that when he calculates actual prices for the current and previous quarter, they need not be based on the same set of CRT models. In this example, Sanyo purchased the same 29-inch bare CPT model from SDI in Q1 2003 (A29UR00006) as in Q2 2003, and, although it started purchasing a second 29-inch bare CPT model from SDI in Q3 2003 (A29GR00127), Sanyo paid average quarterly prices of less than \$100 for each of these two models in every subsequent quarter.

⁵⁹ Leitzinger Report, fn. 88.

⁶⁰ Specifically, for each quarter in which a given CRT model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price

(footnote continued ...)

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observations in Dr. Leitzinger's regression analysis (and alters 27 others). However, removing these few outliers causes the estimated coefficient on the previous quarter's alleged target price to decline from 0.32 to 0.26 and the estimated coefficient on the change in the alleged target price from the previous quarter to the current quarter to decline from 0.16 to 0.14.

80. The second methodological flaw in Dr. Leitzinger's regression analysis is that he combines prices for different CRT models for the same manufacturer, application, size, finish, customer and quarter into a single observation, which means that when he calculates actual prices for the current and previous quarter, they need not be based on the same set of CRT models.⁶¹ As a result, Dr. Leitzinger's methodology needlessly manufactures artificial variation in his quarterly average actual prices. Instead, I have calculated quarterly average actual prices separately for each model, customer, and quarter, and then re-run Dr. Leitzinger's regression analysis (after applying the outlier filter noted earlier). The resulting estimated coefficient on the previous quarter's alleged target price to decline further from 0.26 to 0.17 (as compared to calculating quarterly average prices at the panel level and applying the outlier filter) and the estimated

(... footnote continued)

increases," respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (3) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer.

⁶¹ For example, in Q4 2003, SDI sold seven different 21-inch bare CPT models to Samsung Electronics at prices ranging from \$33.56 to \$45.21. In the following quarter, SDI sold only three of those models plus one additional 21-inch bare CPT model to Samsung Electronics at prices ranging from \$33.14 to \$43.14. Additionally, Samsung Electronics purchased a relatively higher share of the more expensive models in Q1 2004 than in Q4 2003. As a result, even though Samsung Electronics paid a lower price for two of the three models that it purchased in both quarters and virtually the same price for the third model, Dr. Leitzinger's regression data reflects a 7.8% increase (from \$39.85 to \$42.94 in the price that Samsung Electronics paid SDI for 21-inch CPT models from Q3 2003 to Q1 2004).

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coefficient on the change in the alleged target price from the previous quarter to the current quarter to decline further from 0.14 to 0.12.⁶² Thus, correcting for these two flaws in Dr. Leitzinger's methodology results in a substantial reduction in a substantial overcharge in his estimate of average relationship between actual and target prices.

81. In sum, for all the reasons described above, Dr. Leitzinger's actual-target regression fails to demonstrate that the alleged cartel effectuated class-wide impact through its alleged setting of target prices.

Dr. Leitzinger's Hedonic Regressions Undermine Claims of Class-wide Cartel Impact

82. Dr. Leitzinger estimates a series of hedonic regressions using CDT and (separately) CPT data. These regressions attempt to predict CDT and CPT prices based on several characteristics⁶³ of these CRTs, the transaction quantities, and brand value.⁶⁴ Dr. Leitzinger asserts that the high R-squared statistics of his hedonic regressions implies that product characteristics and other factors included in his regressions explain a substantial portion of the variation in CRT prices. Put differently, he claims that there is little CRT price variation once he accounts for certain product characteristics. In his report, he

⁶² I also addressed two additional flaws in Dr. Leitzinger's methodology. First, Dr. Leitzinger's regression analysis includes sales between integrated entities that sold CRTs, even though the prices for these transactions may not be market-based. Second, Dr. Leitzinger treated all the sales for which the customer name was missing as if they were purchased by a single customer. For these observations, when he calculates actual prices for the current and previous quarter, he is most likely comparing purchases by different customers. Because prices for a given CRT model often vary across customers, this assumption introduces artificial variation in his quarterly average actual prices. Nevertheless, removing sales between integrated entities that sold CRTs and sales for which the customer name is missing have a de minimis effect on the results of Dr. Leitzinger's regression analysis.

⁶³ These characteristics are: size, aspect ratio (i.e., whether the CRT is widescreen or not), and whether the CRT was sold with or without a deflection yoke (the "finish" of the CRT). Dr. Leitzinger estimated these regressions separately for each calendar quarter during the class period. Results from Dr. Leitzinger's hedonic analyses are presented in Figure 5 of his report, and they are discussed in ¶¶ 34-38.

⁶⁴ Dr. Leitzinger includes manufacturer fixed effects in his hedonic regressions to control for differences across manufacturers.

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describes this as evidence that “selective conspiracy impacts do not appear to be the reason for the observed [CRT] price variability.”⁶⁵ Thus, Dr. Leitzinger appears to claim that his hedonics regressions imply that any impact the alleged cartel had on prices would have been class-wide. However, for reasons described below, Dr. Leitzinger’s hedonic regressions do not demonstrate (and in fact are inherently incapable of demonstrating) that any impact would have been class-wide, a fact that Dr. Leitzinger conceded at his deposition.⁶⁶

83. Even if Dr. Leitzinger’s hedonic regressions predict CRT prices as well as he claims they do, the R-squared statistics of these regressions are irrelevant for the purpose of testing whether alleged cartel activities resulted in class-wide impact – even if the putative cartel had highly differentiated impacts on CRT prices, the hedonic regressions could still have high R-squared statistics. This is not surprising because the said regressions only use actual CRT price data from the claimed cartel period; they do not in any way employ but-for prices or compare actual and but-for prices for any type of CRT.⁶⁷

84. The fundamental inability of the high R-squared statistics of Dr. Leitzinger’s hedonic regressions to provide any insight into whether the alleged cartel had a uniform or differentiated impact on CRT prices is illustrated by the following thought experiment: suppose that the but-for price for all CDTs and CPTs was \$100, and a hypothetical CRT cartel succeeded in elevating all CPT prices to \$110, but the cartel was entirely unsuccessful in elevating CDT prices. In this hypothetical, knowing a CRT’s product characteristics – specifically, whether it was a CDT or CPT – would enable one to perfectly predict its price (producing the highest-possible R-squared of 1), even though the cartel’s impact is clearly not consistent. This example illustrates why the ability of CRT product characteristics to explain CRT prices accurately provides no information

⁶⁵ Leitzinger Report, ¶ 38.

⁶⁶ Leitzinger Deposition, pp. 93-94.

⁶⁷ At his deposition, Dr. Leitzinger acknowledged that his hedonic regressions do not estimate or use but-for prices (Leitzinger Deposition, p. 94).

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regarding whether any impact was uniformly positive across CRTs with different product characteristics.

85. At his deposition, Dr. Leitzinger acknowledged that his hedonic regressions could produce high R-squared statistics even if the alleged cartel affected only CPT prices but not CDT prices (or vice versa) and if it affected only small CPT prices but not large CPT prices.⁶⁸ In effect, Dr. Leitzinger acknowledges that even if CRT prices were largely determined by observable factors common to class members, it would not in any way establish that the alleged cartel had a class-wide impact.

86. Although the high R-squared statistics highlighted by Dr. Leitzinger are irrelevant for assessing class-wide impact of the alleged cartel, other elements of his hedonic regressions undermine his claim of class-wide impact because they demonstrate that market conditions differed materially across various segments of CRTs. For example, Dr. Leitzinger's hedonic regressions show that the price premiums of larger CPTs over smaller CPTs changed substantially over time, which indicates that heterogeneous market forces determined the prices of CPTs of different sizes.

87. To analyze whether the average price differences between CRTs of different sizes varied over time, I implemented Dr. Leitzinger's hedonic regression model on his data. The hedonic analysis estimates for each quarter the price premium commanded by larger CRTs over smaller CRTs (holding constant other factors included in the regression). I then compared the price premiums commanded by larger CRTs across calendar quarters to see if they changed significantly – a step not taken by Dr. Leitzinger.

88. Specifically, I estimated separate regressions for each quarter (as Dr. Leitzinger does), and I recorded for each quarter for which data were available the relative prices estimated by the model for the most popular CPT sizes.⁶⁹ I then compared the estimated

⁶⁸ Leitzinger Deposition, pp. 200-201.

⁶⁹ I have examined 14, 20, 21, 29 and 34-inch CPTs, and 14, 15, 17 and 19-inch CDTs which are the application-size combinations that account for the largest number of observations (at least 9% each) in their respective applications (CDT/CPT) during the analysis period.

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average price of the largest CPT with the estimated prices of smaller CPTs in each quarter holding other CPT characteristics constant. The results are presented in Exhibit 5. They show substantial variation in the price premium commanded by the largest CPTs over smaller CPTs during the class period, even after controlling for all the characteristics that Dr. Leitzinger controls for. For example, the blue line in Exhibit 5 shows that in 2003, 34-inch CPTs were priced 834% above 14-inch CPTs (on average) based on Dr. Leitzinger's hedonic regressions but, by 2007, this premium had decreased to 533%. All year-over-year changes in the CPT 34-inch vs. 14-inch premiums (with the only exception of 2002 to 2003) were statistically significantly different from zero at the 5% level. More generally, more than 80% of all year-over-year changes in the price premiums commanded by larger CPTs were statistically significantly different from zero at the 5% level.⁷⁰ I performed a similar analysis for CDTs and found similar results.⁷¹

89. The substantial variation in relative prices of CRTs over time is strong evidence that market conditions differed materially across CRTs. If different segments of CRTs were subject to different market forces, then it would be incorrect to assume that the alleged cartel had a class-wide impact on all CRT segments. Later in this report, I explain that further evidence of differentiated market forces and differentiated cartel impacts is found in Dr. Leitzinger's own CRT overcharge model and data which show that the alleged cartel had no impact on several large categories of CRTs.

90. In addition to the variability over time of relative prices across different size categories of CRTs, the relative prices of CRTs also were far from uniform across

⁷⁰ This conclusion was reached by estimating a single regression for two consecutive years and testing the hypothesis that the size premium has changed. The vast majority of year-over-year changes (80% or more) remain significant under several alternative specifications: weighting the regressions by transaction quantity, controlling for the differences in exchange rates between the transactions, removing horizontal transfers, and dropping potential outlier observations (those with the top and bottom 2.5% of prices for each application/size in each quarter).

⁷¹ For CDTs, I analyzed year-to-year changes of 19-inch vs. 14-inch premiums, 19-inch vs. 15-inch premiums, and 19-inch vs. 17-inch premiums. I found that more than 90% of year-to-year changes in premiums were statistically significant. The high incidence of significant year-to-year changes is robust to the specification variations described in the previous footnote.

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manufacturers, i.e., price differentials across manufacturers varied over time. For example Exhibit 6 shows that the average price premium for Panasonic/MTPD CPTs relative to SDI CPTs (controlling for other factors included in the hedonic regression)⁷² ranged from about 64% in 1999 to about zero by 2006. In all but one case (2006 to 2007), the annual changes in the Panasonic/MTPD vs. SDI CPT price premiums were statistically significantly different from zero at the 5% level.⁷³

91. These variations make it less likely that the alleged cartel was effective in raising prices of CRTs class-wide. Based on the putative target prices identified by Dr. Leitzinger, the alleged cartel did not set target prices for every type of CRT in most quarters. Dr. Leitzinger provides no explanation of how the alleged cartel members, in the face of relative prices that varied widely across manufacturers and over time, would have reached a common understanding about what price to charge for each CRT absent a complete set of explicit target prices. Without such a common understanding, it is unlikely that the alleged cartel would have been consistently effective in elevating CRT prices on a class-wide basis.

92. Finally, Dr. Leitzinger is mistaken in his view that the high R-squared statistics of his hedonic regressions are evidence that CRT prices were determined mostly by a few observable product characteristics, the identities of sellers, and transaction size.⁷⁴ A relatively high R-squared in a hedonic regression is entirely consistent with both (a) individual factors having an important role in determining prices; and (b) his hedonic regressions being unable to reliably predict prices of individual CRTs.

⁷² I used Panasonic/MTPD and SDI in this analysis because these manufacturers accounted for the largest share of CRT sales for which data were produced in the instant matter. Moreover, I analyzed primarily CPTs because relatively little data were available on Panasonic/MTPD CDT sales after 2001.

⁷³ This conclusion was reached by estimating a single regression for two consecutive years and testing the hypothesis that the manufacturer price premium changed. The high incidence of significant year-to-year changes is robust to the specification variations described in *supra* note 70. Large year-over-year changes in this premium are also evident for CDTs.

⁷⁴ Leitzinger Report, ¶ 34 (“I find that almost all of the observed pricing variability is related to these non-conspiracy factors [included in his hedonic regressions].”)

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93. To illustrate the fallacy of relying on a high R-squared statistic as Dr. Leitzinger does in this context, consider a regression that tries to predict the prices of cars and bicycles based on the number of wheels. Such a regression would likely have a very high R-squared statistic, *i.e.*, the number of wheels would predict a high proportion of the variations in the prices simply because cars are priced much higher than bicycles on average. However, this regression would not reliably predict the price of an individual bicycle or car, and one would not conclude from the high R-squared statistic that similar market forces determine prices of cars and bicycles. Similarly, Dr. Leitzinger obtains a high R-squared statistic because CRT prices are highly correlated with CRT size (for instance), but that does not imply that his analysis is able to reliably estimate the prices of individual CRTs of a given size. There were other influences not captured in his model that materially affected prices.

94. To further illustrate the material variation in CRT prices not captured by hedonic regressions, recall that several “target price” documents cited by Dr. Leitzinger indicate that alleged conspirators considered price differentials between manufacturers of 5% or less to be enough to shift sales and shares.⁷⁵ Thus, if it were true that Dr. Leitzinger’s hedonic regressions leave no material price variation unexplained, then the gap between the prices predicted by these regressions and the actual prices should rarely exceed 5%. In fact, I found the opposite: very rarely are the prices predicted by Dr. Leitzinger’s regressions within 5% of the actual prices charged for specific CDTs as seen in Exhibit 7A. In all but four quarters, the (absolute) difference between actual observed CDT prices and prices predicted by Dr. Leitzinger’s hedonic regressions exceeded 5% for more than 40% of observations. For CPTs, the prediction error exceeded 5% in all but four quarters for more than 33% of observations. (See Exhibit 7B.)⁷⁶

⁷⁵ See *supra* note 54.

⁷⁶ The gap between actual CRT prices and prices predicted by Dr. Leitzinger’s hedonic regressions is substantial. For the top quartile of the observations, the (absolute value of the) mean gap is 11.2% for CDTs and 12.4% for CPTs.

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95. I thus conclude that a material amount of CRT price variation arises from factors not included in the hedonic regressions. Some of this remaining variation in CRT prices may well have been due to inconsistent impacts of the alleged cartel. At a minimum, Dr. Leitzinger's hedonic regressions do not rule out this possibility.⁷⁷

IV. There Is No Evidence of a “Price Structure.”

A. No Evidence of a “Structure” to Prices of CRTs and CRT Finished Products

96. Dr. Leitzinger claims that CRT prices exhibited a “structure” such that prices of various categories of CRTs were linked economically and thus moved together.⁷⁸ Dr. Leitzinger primarily relies on a price correlation analysis to support his claim that a price structure existed for CRTs. For example, in Figure 9 of his report, Dr. Leitzinger presents an analysis that appears to demonstrate a high degree of correlation (co-movement) in average prices of CRT categories that he claims were directly targeted by the alleged cartel and average prices of CRT categories that potentially were not targeted.

97. I demonstrate in this section that Dr. Leitzinger's claim that a CRT price structure existed is unsupported by his price correlation analyses and more generally by the evidence on record. In fact, as explained earlier, Dr. Leitzinger's own hedonic regressions show substantial variation over time in the relative prices of CRTs of different sizes, which is evidence that different market conditions prevailed in various segments of CRTs and undermines Dr. Leitzinger's claim that a price structure existed for CRTs.

98. Before explaining the flaws in Dr. Leitzinger's correlation analyses, I first describe in this section the salient features of the CRT marketplace, the enormous heterogeneity in

⁷⁷ This conclusion is left unaltered under the following alternative specifications: weighting the regression by transaction quantity (59% and 57%), controlling for the differences in exchange rates (57% and 51%), removing horizontal transfers (60% and 53%), and dropping potential outlier observations with the top and bottom 2.5% of prices for each application/size in each quarter (56% and 51%). (The percentages in parentheses are the percentage of CDT and CPT observations, respectively, that deviate from predicted prices by 5% or more over the entire period.)

⁷⁸ Leitzinger Report, § VI B.

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CRTs and CRT finished products, and the differentiation in the market forces to which various CRTs and CRT finished products were subjected. In view of this diversity, it is not surprising that CRT pricing dynamics do not exhibit anything like the structure that Dr. Leitzinger claims.

Widely Differentiated CRTs and CRT Finished Products Resulted in Widely Different Dynamics for Their Prices.

99. CRTs were widely differentiated along many dimensions. For example, I understand that CPTs were used exclusively in televisions, whereas CDTs were used predominantly in desktop computer monitors and were not used in televisions. The two were not substitutes from the standpoint of manufacturers of monitors and TVs (i.e., customers of CRT manufacturers) because of differences in resolution, electrical current tolerances and brightness.^{79, 80} CPTs and CDTs were each further differentiated along a variety of dimensions. For example, CPT pricing depended on CPT size, shape (curved or flat), and

⁷⁹ I understand that CPTs and CDTs are characterized by several different properties. A key product feature of CPTs is high brightness, while CDTs are characterized by high resolution. The two CRT types also exhibit different mask and phosphor structures. (SDCRT-0021278-SDCRT-0021294 at 1288). Additionally, there is a tradeoff between the two products with regard to resolution and the power the CRT is able to withstand. CDTs are not able to withstand the current of a television due to their thin masks, which are needed to produce a high resolution, while CPTs do not have a high enough resolution to be used in monitors but are able to withstand a higher current than CDTs. (Tobinaga (Panasonic, MTPD) Deposition, p. 143.) The evidence related to supply-side substitution is mixed. CRT production lines could be converted from producing CPTs to CDTs and vice versa. However, this change required time and effort. Most production lines produced a single application exclusively. For example, SDI's CPT and CDT production was, for the most part, "completely separated," the exception being small sizes. (Lee (SDI) Deposition, pp. 113-114, 121-122.)

⁸⁰ At his deposition, Dr. Leitzinger agreed that a TV manufacturer would not consider a CDT to be a good substitute for a CPT when making televisions and that a monitor manufacturer would not consider a CPT to be good substitute for a CDT when making monitors. (Leitzinger Deposition, pp. 68-69.)

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the type of “mask”⁸¹ included in the CPT. Similarly, CDT pricing depended on CDT size, shape, frequency,⁸² and glare.⁸³

100. A particular CRT model was not easily interchangeable with other CRT models, even those that may have shared similar basic features. Each CRT model was designed to fit the specific technical requirements of a particular finished product requested by a customer. For example, the connection points between the CRT and the external casing were specific to a given customer’s finished product design. Other features that were specific to a CRT destined for a particular finished product included the electrical components of the CRT.⁸⁴ Such customization limited the ability of a finished product manufacturer to interchange different CRT models for a given finished product. For example, according to a Philips witness, customers could not always interchange a Philips CRT for another manufacturer’s CRT without significant modifications to the finished product.⁸⁵ An SDI witness testified that customers would take up to a year to qualify new suppliers of CRTs.⁸⁶

⁸¹ The “shadow mask” is a finely perforated screen that ensures that an electron beam strikes the correct phosphor dot. “In a colour picture tube, it is absolutely necessary to ensure that each of the three electron beams strikes only one phosphor in each triad. For this purpose, a mask, called a shadow mask or an aperture mask, is inserted between the neck of the picture tube and the phosphor dot screen.” (Bali, S. P. (1994). *Colour Television: Theory and Practice*. Delhi: Tata McGraw-Hill Publishing Company Limited. p. 83)

⁸² The “frequency,” also called the refresh rate, is the number of times per second the image on a display device is refreshed or restroked on the screen. (Graf, R. F. (1999). *Modern Dictionary of Electronics, 7th Edition*. Woburn, MA: Butterworth-Heinemann.)

⁸³ Lee (SDI) Deposition, pp. 38, 101; Deposition of Hirokazu Nishiyama, July 17-18, 2012 (“Nishiyama (Panasonic, MTPD) Deposition”), pp. 73-75, 144-145; Kurosawa (Toshiba Corp.) Deposition, pp. 93-94, 98-99.

⁸⁴ Tobinaga (Panasonic, MTPD) Deposition, p. 142; Deposition of Toru Iwasawa, July 11, 2012 (“Iwasawa (Hitachi) Deposition”), pp. 29-30.

⁸⁵ Deposition of Roger de Moor, July 31 - August 1, 2012 (“de Moor (PENAC) Deposition”), pp. 141-143.

⁸⁶ Lee (SDI) Deposition, p. 213.

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101. In addition, some CRTs were sold by manufacturers such as Toshiba that were vertically integrated for at least part of the class period (i.e., the CRT manufacturer was affiliated with a downstream manufacturer of CRT TVs and/or CRT monitors), while other CRTs were supplied by CRT manufacturers such as Chunghwa that were not integrated.⁸⁷

102. Exhibit 8A illustrates the substantial amount of dispersion in each quarter during the class period in the CRT prices charged by the nine manufacturers that have produced CRT sales data in the instant matter.⁸⁸ Taking Q3 2001 as an illustrative example, 10% of CRT prices that quarter were below \$39 and 10% were above \$221 (i.e., more than 5x higher). Substantial price variation can be observed in Exhibit 8A for other quarters. This price variation was due to differences in product and customer characteristics.⁸⁹ Similarly, Exhibit 8B shows that CRT finished product prices also exhibited substantial dispersion. The exhibit shows the dispersion in prices charged for CRT TVs and monitors by seven finished products manufacturers.⁹⁰ As seen in the exhibit, there is considerable

⁸⁷ I understand that the following CRT manufacturers were majority-owned by a corporate parent that also owned a majority share of a finished-product manufacturer: Hitachi, LG (prior to July 2001), Philips (prior to July 2001), Panasonic (prior to 2003), Toshiba (prior to 2003), and MTPD (starting in 2003). Chunghwa, LPD (starting in July 2001), and SDI were not.

⁸⁸ Eight manufacturers produced CRT sales data in the instant matter: Chunghwa, Hitachi, LG, LPD, MTPD, Panasonic, SDI and Toshiba. Additionally, LPD produced data from Philips' legacy CRT business that it acquired in July 2001. Unless otherwise noted, analyses presented in this report that pertain to CRT prices are based on the sales data from these nine sources.

⁸⁹ Each observation in Exhibit 8A represents the average price at which a specific CRT model was sold to a specific customer in a specific quarter. Weighting observations by sales volume does not alter my conclusion that CRT prices in any given quarter exhibited substantial heterogeneity. For example, on average, the 90th percentile of the sales-volume-weighted distribution of CRT prices in a given quarter were 66% higher than the weighted average CRT price for that quarter, and the 10th percentile of the distribution was 54% below the average price. Put differently, on average, the 90th percentile of the sales-volume-weighted distribution of CRT prices in a given quarter was over 3 times as expensive as the 10th percentile.

⁹⁰ The seven finished products manufacturers are: Hitachi, LG, Panasonic, Philips, SEA, Tatung, and Toshiba. Dr. Leitzinger relied on data from these seven manufacturers.

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variation in finished product prices – both within and across manufacturers.⁹¹ This variation is due to the variety of TVs and monitors offered by each CRT finished product manufacturer in a given quarter, changes in that mix over time, and differences across finished products manufacturers.

103. Prices of the various CRTs and CRT finished products also *changed* in heterogeneous ways. As illustrated in Exhibit 9A, quarter-to-quarter changes in CRT prices varied substantially in their direction and magnitude. In nearly every quarter during the class period, the quarter-to-quarter price changes of CRTs ranged from increases of more than 10% to decreases of more than 15%. Prices frequently moved in opposite directions. For example, between Q2 2002 and Q3 2002, almost 17% of CRT prices (quantity weighted) declined by at least 5%,⁹² while about 21% of CRT prices increased and another 8% did not change.⁹³

104. Similarly, Exhibit 9B shows the substantial variation in any given quarter in changes in CRT *finished product* prices at the seven finished products manufacturers whose data are utilized by Dr. Leitzinger. For example, between Q3 2005 and Q4 2005,

⁹¹ Each observation in Exhibit 8B represents the average price at which a specific CRT finished product model was sold to a specific customer in a specific quarter. Weighting observations by sales volume does not alter my conclusion that CRT finished product prices in any given quarter exhibited substantial heterogeneity. For example, on average, the 90th percentile of the sales-volume-weighted distribution of CRT monitor and TV prices in a given quarter was 84% higher than the weighted average CRT monitor and TV price for that quarter, and the 10th percentile of the distribution was 54% below the average price. Put differently, on average, the 90th percentile of the sales-volume-weighted distribution of CRT monitors and TVs in a given quarter was roughly 4 times as expensive as the 10th percentile. Thus, it is clear that a substantial *volume* of CRT monitor and TV prices were widely dispersed

⁹² Five percent is a material change for a single quarter. For context, average CPT and CDT prices respectively declined by 2% and 3% per quarter during the class period, which was enough to produce a cumulative decline of nearly 63% and 82% in average CPT and CDT prices, respectively, over the course of the class period. (Here, changes in “average” CPT and CDT prices refer to changes in the Fisher Price Indices of each, as illustrated in Exhibit 13.)

⁹³ In roughly half of the quarters during the class period, at least 19% of CRT prices declined (quarter-over-quarter) by 5% or more while at least 10% of CRT prices increased or remained unchanged during the same period.

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15% of CRT finished product wholesale prices declined by at least 2%, while about 55% of finished product prices increased or did not change for all manufacturers.⁹⁴

105. Further evidence of divergent CRT price changes is provided in Exhibit 10A, which shows that changes in the *average* price of CDTs provided an extremely poor prediction of contemporaneous changes in CPT prices and vice versa. For example, in the quarters that experienced the largest changes in the average CDT price during the class period, 28% of CPT prices either changed in the opposite direction or did not change at all.⁹⁵ (See Exhibit 10A.)⁹⁶

⁹⁴ This was not atypical. In 24 of the 51 pairs of consecutive quarters in the class period, at least 15% of CRT finished-product prices declined (quarter-over-quarter) by 2% or more while at least 50% of TV and monitor prices increased or did not change. (These estimates are based on sales prices of all CRT finished-products sold by the finished product manufacturers identified in the notes to Exhibit 9B.)

⁹⁵ I implemented this test as follows: I first identified quarters that experienced the largest quarter-to-quarter changes in global CDT average prices (as measured by the CDT Fisher Price Index) during the class period. Specifically, I identified the 25% of quarters that saw the largest changes in the CDT Fisher Price Index. (During these quarters, the CDT Fisher Index changed by at least 6% per quarter.) For each of these quarters, I assessed the fraction of CPT prices that changed in the opposite direction and the fraction of prices that did not change during the same time period. (A CPT “price” was defined as the quarterly weighted average price paid by a particular customer for a particular CPT model.) I then averaged the results across the quarters in the sample using quarterly CPT sales volumes as weights. This methodology is described in the notes to Exhibit 10A.

⁹⁶ The metric of co-movement in CRT prices I employ in Exhibit 10A and in Exhibit 10B almost surely overstates the extent to which a hypothetical overcharge in one CRT category would cause prices in the other CRT category also to be higher. In my analysis, which tracks changes in prices over time, inter-temporal shocks that directly affect all CRT prices are likely to cause prices to move in the same direction for reasons that have nothing to do with demand-side or supply-side substitution. For example, the price of natural gas likely affects the cost of manufacturing glass of all types, and hence the prices of flat glass panes used in windows of buildings may be correlated with the prices of CRTs, which also use glass. However, such a correlation does not imply that if a cartel increased the price of either CRTs or flat glass panes that it would necessarily result in an increase in the price of the other. Any co-movement caused by inter-temporal market-wide shocks that directly affect all CRT prices has no bearing on whether a hypothetical overcharge in one product category would cause prices for the other product category also to be higher, because a hypothetical overcharge does not involve an

(footnote continued ...)

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106. Moreover, quarter-to-quarter price changes varied widely across different-sized CPTs. For example, in the quarters that experienced the greatest changes in the average price for *small* CPTs, 33% of *large* CPT prices either changed in the opposite direction or did not change at all.⁹⁷ (See Exhibit 10A.) The diversity of price movements depicted in Exhibit 10A shows that different market forces affected large and small CPTs or the same forces affected them differently. In view of this, any hypothesized evidence that the alleged cartel succeeded in elevating the price of small CPTs would not necessarily imply that prices were also elevated for large CPTs (and vice versa).^{98, 99}

(... footnote continued)

increase in price over time, but rather an increase in price relative to a counterfactual but-for world *at the same point in time*.

⁹⁷ “Small” CPTs are defined as CPTs that are smaller than 20 inches in diagonal length. “Medium” CPTs are defined as CPTs between 20 and 29 inches in diagonal length. Large CPTs are defined as CPTs that are at least 30 inches.

⁹⁸ Often CRT prices were negotiated in currencies other than the USD. Nonetheless, the USD is the proper currency for analyzing price variation because the target prices that Dr. Leitzinger alleges that the putative cartel used to fix prices were denominated in U.S. dollars. (Leitzinger Report, ¶¶ 5-6.) If the same market forces applied to all CRTs, one would expect USD price changes to be similar across all CRTs even if some prices were negotiated in foreign currencies. This is true even in the presence of exchange rate movements. Nonetheless, in order to further confirm my findings, I have also examined the extent of heterogeneity in changes in negotiated prices (*i.e.*, prices expressed in the currency in which they were negotiated). The results of these analyses clearly illustrate that even when prices are expressed in the currencies in which they were negotiated, price changes exhibited a substantial amount of heterogeneity across CRTs, with many prices increasing and many other prices decreasing in the same quarter. For example, in the 25% quarters that experienced the largest changes in the average CDT price during the class period, 29% of CPT prices either changed in the opposite direction or did not change at all when prices are expressed in the negotiated currency. Also, in the 25% of quarters that experienced the greatest changes in the average price for *small* CPTs, 32% of *large* CPT prices either changed in the opposite direction or did not change at all when prices are expressed in the negotiated currency.

⁹⁹ In order to further investigate divergent CRT price movements illustrated in Exhibit 10A, I have compared the differences in quarterly price changes among the CRTs whose prices increased the most with price changes among the CRTs whose prices decreased the most. For example, for the 25% of quarters with the greatest (absolute) changes in the average price of CDTs, the average difference between (a) the mean change in prices of CDTs in the top quintile of price changes and (b) the mean change in prices of CDTs in the bottom quintile of price

(footnote continued ...)

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107. Similar results obtain for prices of CRT finished products as shown in Exhibit 10B. For example, in the quarters that experienced the greatest changes in average CRT TV prices across finished product manufacturers, 38% of CRT monitor prices at the same finished product manufacturers changed in the opposite direction or remained unchanged.

108. This kind of variation in price movements makes proving antitrust impact on all direct purchasers in the U.S. based on a “price structure” theory implausible. By way of an example (noted above), between Q2 2002 and Q3 2002, almost 17% of CRT prices declined by at least 5%, while about 21% of CRT prices increased during the same quarter. Suppose, hypothetically, that the evidence indicated that collusion affected the pricing of those CRTs whose prices increased from Q2 2002 to Q3 2002. None of the analyses in Dr. Leitzinger’s report demonstrate that proof of cartel impact on CRTs whose prices increased from Q2 2002 to Q3 2002 can somehow also serve as common proof of antitrust impact with regard to CRTs whose prices actually declined during the same period.

109. The heterogeneous price dynamics of CRTs and CRT finished products likely were the result of differentiated features of these products and more importantly the result of substantially different market forces that influenced the prices of different CRT product segments at various points during the class period. From 2000 onward, fierce competition from LCD and plasma display technologies rapidly shrank the CRT share of the display market. This development affected certain types of CRTs more than others. I turn to this next.

(... footnote continued)

changes was 14 percentage points. This is a substantial difference given that the median change in prices of CRTs in all quarters was just -2.1%. Similar results are obtained for other CRT categories analyzed in Exhibit 10A.

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Substantially Different Market Forces, Such as Competition from LCD and Plasma Technologies, Influenced CRT and CRT Finished Product Prices Differently during the Alleged Class Period.

110. CRT finished products' shares of desktop monitors and TVs sold globally began to decline around 2000. Exhibit 11A shows that CRT desktop monitors accounted for 91% of global desktop monitor sales in early 2001 but only 10% of such sales by the end of 2007. CRT TVs' share of global TV sales also declined during this time period, albeit more slowly: CRT TVs accounted for nearly 100% of global TV sales in early 2001 but only 48% by the end of 2007.¹⁰⁰ During this time, CRT TVs' share of North America TV sales declined more than in much of the rest of the world.¹⁰¹

111. The decline in CRT finished-products' share of global TV and monitor sales was a result of competition from LCD and plasma technologies,¹⁰² and the share trends evident

¹⁰⁰ I exclude rear-projection CRT TVs from my analyses since I understand that they are not part of the instant litigation.

¹⁰¹ For example, by the end of 2007, CRT TVs' share of TV sales in North America had shrunk to 14% compared to a global share of 48%. (Exhibits 11A and 11B)

¹⁰² Contemporaneous documents refer to the displacement of CRTs by LCDs and plasma as the following examples illustrate:

- “As LCD prices fall CRTs will lose share;” “CRTs are boxy, heavy, thick and consume more power than competing technologies;” “Consumers [sic] belief that digital/HDTVs require non-CRT solution and that the CRT [sic] forma [sic] factory is old fashioned.” (TAEC00006084. Shulklapper, Andrew. DisplaySearch HDTV Forum 2004: Accelerating the HDTV Transition, August 24-26, p. 11. See also pp. 4-17.)
- “The PC monitor market is going through some significant changes as the transition from cathode-ray tubes (CRTs) to LCDs begins to hit with full force. Worldwide revenue for LCD monitors will outpace CRT revenue in 2003, and the crossover for worldwide unit shipments will occur in 2004.” (TAEC00006176. Gallo, J. and O'Donnell, B. “Worldwide PC Monitor Forecast and Analysis, 2002-2007: Looking Ahead”, IDC, May 2003 at p.1. See also pp. 6, 8-32.)

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in Exhibit 11A and Exhibit 11B show that the new technologies impacted CRT monitors earlier and to a greater extent than CRT TVs.¹⁰³

112. LCD and plasma competition impacted large CRT TV sales earlier and more significantly than sales of small and medium CRT TVs. As is evident in Exhibit 12A, the global penetration of large CRT TVs¹⁰⁴ (relative to other technologies) shrank from 78% in 2001 to just 11% by late 2007, while the penetration of small and medium CRT TVs declined by less – from nearly 100% to about 78% during the same period.¹⁰⁵

113. Given the differential impact of LCD and plasma competition on various segments of CRTs, it would not be surprising to find very different dynamic price patterns for various segments of CRTs. Consistent with this view, my analyses of CRT pricing data demonstrate that global prices of CRTs typically fell more and earlier than prices of CPTs. Moreover, global prices of large CPTs fell more than for small and medium CPTs, and global prices of flat CPTs (which were closer substitutes for LCD and plasma TVs¹⁰⁶) declined more than prices of curved CPTs during much of the relevant period.

¹⁰³ Contemporaneous documents also acknowledge the differential impact of LCD competition on monitors and TVs. See, e.g., PHLIP-CRT-049353(February 2004 presentation) which notes that “LCD technology development has exceeded all expectations” and that “CRT monitors are more severely affected by LCD demand” (p.3).

¹⁰⁴ For the purpose of my analyses, “large” CRT TVs are defined to be TVs that are at least 30 inches in viewable size.

¹⁰⁵ CRT TVs fared poorly among large TVs sold in North America, declining from 66% in early 2001 to just 5% by late 2007, while CRT TVs’ share of small and mid-sized TVs fell from almost 100% in early 2001 to 38% by late 2007. See Exhibit 12B.

¹⁰⁶ See, e.g., “To compete with the flat panels, the CPT makers and TV OEMs are boosting production of flat-face CRTs.” (iSuppli, “Flat-Panel Sets Gain Strong Footing in TV Market”, Television Systems, Market Tracker – Q1 2006, CHU00154658 – CHU00154694 at CHU00154673.)

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114. The different trends in prices of CDTs and CPTs are illustrated in Exhibit 13. The chart tracks average prices (measured using chained Fisher Indices^{107, 108}) of CPTs and CDTs sold globally during the class period. As illustrated in Exhibit 13, the average prices of CDTs and CPTs fell during much of the period, but the average price of CDTs declined more than the average price of CPTs. This is consistent with the view that CDTs faced greater competition from LCDs than did CPTs.

115. In addition to the differences in price dynamics between CPTs and CDTs, various categories of CPTs also exhibited differentiated price dynamics. For example, prices of larger CPTs exhibited different trends than prices of smaller CPTs. Specifically, the Fisher Price Index for larger CPTs declined more rapidly than the Fisher Price Indices for small and mid-sized CPTs during the relevant period. This pattern is illustrated in Exhibit 14. Moreover, as explained before, their quarter-to-quarter changes demonstrate highly differentiated pricing patterns. (See Exhibit 14.)

116. Prices of flat CPTs declined more rapidly than prices of curved CPTs, which is unsurprising since flat TVs were likely to be closer substitutes for LCDs and plasma TVs

¹⁰⁷ The quarter-to-quarter change in the Fisher Price Index for CPTs (for example) represents an average of the price changes for CPT models sold to the same customer in both quarters. The price changes across quarters 1 and 2 are averaged in two ways – once using the quarter 1 sales volumes as weights and once using the quarter 2 sales volumes as weights. The change in the Fisher Price Index represents the geometric mean of the two average price changes.

¹⁰⁸ Fisher Indices (or more precisely, chained Fisher Indices of the type I employ) are an accurate way to track changes in average prices of CRTs over time because they remove the effect of changes in product mixes from price trends. (Diewert, W. E. (1993). *The Early History of Price Index Research & Fisher Ideal Output, Input and Productivity Indexes Revisited*. In W.E. Diewert and A.O. Nakamura (Eds.), *Essays in Index Number Theory, Volume I*, Elsevier Science Publishers. pp. 58, 320-330; International Labour Organization. (2004). *Consumer Price Index Manual: Theory and Practice*. International Labour Organization. pp. 6-32.) This is important because the mix of CRTs changed substantially during the class period, with the advent of higher-quality flat, wide-screened, high resolution CRTs that were introduced in response to LCD and plasma competition. Since these high-quality CRTs were priced higher than lower quality CRTs, ignoring the improvement in product quality over time would mask declines in prices for CRTs of similar quality, and hence I remove the effects of changes in product mix by using Fisher Indices.

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than CRT TVs with curved screens.¹⁰⁹ Exhibit 15 shows the Fisher Index of global prices of flat CPTs declining more than the prices of curved CPTs for much of the period since September 2000.

117. In sum, competition from newly emergent LCD and plasma technologies affected different categories of CRTs differentially, and this differentiated impact is evident in the differentiated patterns of CRT pricing.

Conduct Directed at CRT Prices Outside the United States Need Not Have Elevated CRT Market Prices in the United States.

118. In addition to the differentiated price dynamics across product categories, there is substantial evidence of diverse price dynamics across geographic regions. This is another source of differentiation in CRT price dynamics, particularly in CPTs, that is especially relevant here because although U.S.-based Plaintiffs allege a global CRT cartel, most CPTs used in TVs sold in the U.S. were sold or manufactured in North America.¹¹⁰

119. The documents that Dr. Leitzinger relies on to identify CRT “target prices” set by the putative cartel rarely refer to the U.S. or North America.¹¹¹ If, in fact, the alleged

¹⁰⁹ See, e.g., “To compete with the flat panels, the CPT makers and TV OEMs are boosting production of flat-face CRTs.” (iSuppli, “Flat-Panel Sets Gain Strong Footing in TV Market,” Television Systems, Market Tracker – Q1 2006, CHU00154658 – CHU00154694 at CHU00154673.)

¹¹⁰ CPT imports into North America were limited. (Heinecke (TAEC) Deposition, p. 64; Lee (SDI) Deposition, pp. 133-134, 179-180; Deposition of Michael Son, February 5-6, 2013 (“Son (SDI) Deposition”), p. 193.) Moreover, most TVs sold in the U.S. were likely manufactured in North America. (Tobinaga (Panasonic, MTPD) Deposition, p. 57; Deposition of Steve Panosian, July 17, 2012 (“Panosian (SEC, SEA) Deposition”), p. 22; Deposition of Edwin Wolff, July 18, 2012 (“Wolff (PNA) Deposition”), pp. 49-50.)

¹¹¹ Of the 164 documents relied upon by Dr. Leitzinger to identify “target prices,” only a handful refer to North America/U.S. and they typically do not stipulate a target price that is applicable to North America/U.S. (Backup to Leitzinger Report, “Target Prices_part1.csv,” “Target Prices_part1.csv,” and “Target Prices_part3.csv”; see e.g., Visitation Report, CHU00029138-CHU00029143 at CHU00029140, March 25, 2000; Visitation Report, CHU00029171-CHU00029174 at CHU00029172, October 27, 1999; Marketing Visitation Report, CHU00030020-CHU00030025 at CHU00030022, June 18, 2004; Market Visitation

(footnote continued ...)

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cartel typically set target prices with no reference to the U.S. or North America, and if U.S./North American CRT prices and market conditions were materially different from the rest of the world, then members of the DPP class that purchased finished products made using CRTs manufactured in the U.S. or North America potentially may have been unharmed even if the alleged cartel successfully elevated prices of CRTs in the rest of the world.

120. Market conditions for CPTs in North America were indeed different from those in the rest of the world. LCD and plasma technologies penetrated the U.S. market earlier and faster than many other parts of the world. For example, by late 2007 CRT TVs' share of TV sales in North America had shrunk to 14% compared to a global CRT TV share of 48%.¹¹² CRT demand started to decline in North America and in other advanced economies even as demand grew in other regions.¹¹³ Greater competition from LCDs in the U.S. likely would have reduced the impact of the putative cartel in the U.S. relative to the rest of the world. Moreover, the mix of products sold in North America was not the same as in other regions. For instance, CPTs sold in North America were far more likely to be larger than CPTs sold for use in other regions. About 19% of CPTs sold in North America between Q1 1995 and Q4 2007 had a screen size of at least 30 inches but only about 4% of CPTs sold in other regions in the same period were that large.¹¹⁴

121. A significant difference between CDTs and CPTs is that, while few CDTs were produced or sold in North America (most of the monitor production was in Asia), a substantial fraction of CPTs used in TVs sold in the U.S. was either sold or manufactured

(... footnote continued)

Report, CHU00030071-CHU00030078 at CHU00030078, November 7, 2003; Visitation Report, CHU00029262-CHU00029264 at CHU00029264, September 26, 1998.)

¹¹² See Exhibits 11A and 11B.

¹¹³ MTPD-0300203.ppt, at slides 8, 9, 10, and 16.

¹¹⁴ These figures were calculated by identifying observations with a North American (U.S., Canada, or Mexico) or foreign address within Dr. Leitzinger's CRT sales data set.

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in North America.¹¹⁵ Prices of CPTs sold in North America by at least some CRT manufacturers were primarily determined by their North American divisions, i.e., they were not set by global head offices.¹¹⁶

122. Given these facts, it would not be surprising if CPT prices in the U.S. and North America were different from the rest of the world. Indeed, prices of CPTs sold in North America had substantially different patterns of changes than prices of CPTs sold in the rest of the world. Specifically, in the quarters that experienced the greatest changes in average CPT prices sold outside North America, 39% of CPT prices in North America either changed in the opposite direction or did not change at all. See Exhibit 16.

B. Dr. Leitzinger's Price Correlation Analyses Do Not Establish Common Impact, and They Mask the True Heterogeneity in Price Changes.

123. In light of the diverse patterns of price movements among different CRTs, CRT finished products, and regions, it is highly implausible that evidence that is common across the class could prove that most of the members of the proposed class were impacted by the alleged collusion over the pricing of CRTs. Rather, many individualized inquiries would be necessary to assess whether the observed prices are higher than they would have been absent the alleged collusion for the many different CRTs and CRT finished products with diverse patterns of price movements over time.

124. Despite the substantial variation in product and other characteristics affecting CRT prices and the clarity of the data regarding the wide dispersion in CRT price levels and changes, Dr. Leitzinger claims that CRT prices exhibited a "structure."¹¹⁷ This is important to his argument because Dr. Leitzinger acknowledges that he has not been able

¹¹⁵ See *supra* note 110.

¹¹⁶ For example, SDI's Jaemin Lee testified that SDI allowed its regional staff to take the lead in making pricing decisions because market conditions differed greatly across regions (although regional representatives would consult the head office staff for unusually large price changes). (Lee (SDI) Deposition, pp. 185-187, 189).

¹¹⁷ Leitzinger Report, ¶ 50.

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to identify evidence that all categories of CRTs were targeted by the alleged cartel,¹¹⁸ and in fact, as explained above, the alleged target prices that Dr. Leitzinger has identified were applicable to only a small fraction of CRTs sold during the class period. Thus, Dr. Leitzinger depends on the alleged “price structure” to support his assertion that even the prices of CRTs that were potentially not targeted by the alleged cartel were nonetheless affected by the cartel’s target price-setting process because the prices of all CRTs were linked by the purported “price structure.” However, Dr. Leitzinger provides neither a coherent economic explanation for the existence of a price structure among CRTs, nor a plausible data analysis to support his opinion.

125. The only explanation provided by Dr. Leitzinger in his report for how prices of CRTs of different types were linked such that the alleged cartel had a class-wide impact makes little sense as a matter of economic logic or common sense. Dr. Leitzinger contends that CRTs were linked by supply-side substitution, such that, for example, the same production lines could manufacture CDTs as well as CPTs.¹¹⁹ He implies that supply-side substitution would prevent prices and price-cost margins of some CRTs from increasing without affecting the prices of other CRTs, because CRT manufacturers would re-allocate capacity from low-margin CRTs to high-margin CRTs, thereby reducing the supply of low-margin CRTs and increasing their prices and margins. In Dr. Leitzinger’s view, this capacity re-allocation process would ensure that prices of all CRTs would move in the same direction.¹²⁰

¹¹⁸ Leitzinger Report, ¶ 45.

¹¹⁹ Leitzinger Report, ¶¶ 46-7. As explained in *supra* note 79, the evidence on supply-side substitution is mixed. Additionally, as explained above, CRT buyers’ ability to substitute across different applications of CRTs was often limited. The two were not substitutes from the standpoint of manufacturers of monitors and TVs because of differences in resolution, electrical current tolerances and brightness (see *supra* note 79). At his deposition, Dr. Leitzinger agreed that finished product manufacturers would not use CDTs when making TVs or CPTs when making computer monitors. (Leitzinger Deposition, p. 69.)

¹²⁰ Leitzinger Report, ¶ 47.

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126. However, basic economic theory holds that if the alleged cartel successfully elevated prices of targeted CRTs, it also must have sold fewer of those CRTs. Thus, the alleged cartel could not have shifted production from non-targeted CRTs to targeted CRTs without undermining the increase in targeted CRT prices. As a result, as long as the alleged target prices were the primary mechanism for elevating CRT prices, economic theory implies that, all else equal, prices of non-targeted CRTs would not have risen by as much as prices of targeted CRTs. In fact, the prices of non-targeted CRTs may have even declined if the alleged cartel members shifted capacity that was no longer employed in the production of targeted CRTs to the production of non-targeted CRTs.¹²¹

127. Having failed to provide a plausible or coherent economic explanation of how CRT prices were linked in a manner that implies class-wide impact, Dr. Leitzinger proceeds to conduct a “correlation analysis” of CRT prices that he contends shows that the average sales prices of *non-targeted* categories of CRTs moved closely with average sales prices of *targeted* categories of CRTs. Specifically, Dr. Leitzinger estimates correlation coefficients between average prices of categories of targeted and non-targeted CRTs.¹²² The “correlation coefficient” between any pair of CRT prices is a statistical measure of the strength of the average association between them; it ranges between -1 and 1, with -1 representing the most negative association, 1 representing the most positive association, and 0 representing no association. Dr. Leitzinger finds that most correlation coefficients between the average sales prices of targeted and non-targeted categories of CPTs and between the average sales prices of targeted and non-targeted

¹²¹ To the extent that the alleged cartel also agreed to restrict output of CRTs more generally (i.e., not just the outputs of the CRT models with targeted prices) and successfully implemented such an agreement, this could have resulted in increases of even non-targeted CRT prices. Although Dr. Leitzinger cites to some documents that purport to support the claim that the alleged cartel agreed to restrict output (Leitzinger Report, fn. 53), he presents no analysis of the effectiveness of such output restrictions; rather, his analysis of alleged cartel success focuses exclusively on the effectiveness of the alleged target prices. (See, e.g., Leitzinger Report, ¶ 6 and § VI.)

¹²² For example, Dr. Leitzinger estimates the pairwise correlation coefficients between the average prices of 26-inch CPTs (which he classifies as a “non-targeted” CRT category) and the average prices of CPTs in each targeted size category. Leitzinger Report, ¶ 52.

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categories of CDTs exceed 0.8 (although this condition holds for a minority of his CDT price correlations).¹²³ He interprets this as evidence of a structure that linked the actual sales prices of targeted and non-targeted CRTs, and on this basis concludes that price targets set for targeted CRT categories impacted sales prices in non-targeted CRT categories.^{124, 125}

128. However, correlations of the type estimated by Dr. Leitzinger are most likely spurious, produced by basic flaws long recognized by economists. In fact, even if the so-called targeted and non-targeted categories of CRTs were entirely unrelated by any supply or demand substitution, Dr. Leitzinger's analysis would produce a very high estimate of price correlation just because they were affected by common market forces that had nothing to do with the putative cartel. For instance, prices of most CRTs declined during much of the class period due to manufacturing cost reductions¹²⁶ and declining demand for CRTs as buyers switched to improved LCD and plasma technologies in the later years of the class period. This broad-based decline in CRT prices would generate positive correlations between prices of most types of CRTs even if there was no demand or supply substitution among them. Similarly, movements of the business cycle and changes in market conditions also likely contributed to common CRT price changes, thereby producing correlated CRT price movements without regard to economic linkages between CRTs that matter for assessing common impact of the alleged cartel. Economists have long recognized that such "spurious correlation" is a problem for deriving inferences about economic linkages between products.¹²⁷ In fact, elsewhere in

¹²³ Leitzinger Report, Figure 9.

¹²⁴ Leitzinger Report, ¶ 45.

¹²⁵ Leitzinger Report, Figures 9 and 10, and ¶ 52. The price correlations reported in Figures 9 and 10 of Dr. Leitzinger's report are both likely spurious for the reasons explained in this section.

¹²⁶ CRT manufacturing costs declined in part due to plants relocating to low-cost nations (see *infra* note 150).

¹²⁷ See, e.g., Aldrich, J. "Correlations Genuine and Spurious in Pearson and Yule," *Statistical Science*, Vol. 10, No.4, 1995, pp. 364-376.

(footnote continued ...)

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his report, Dr. Leitzinger acknowledges the need to account for supply and demand factors that influence actual prices in order to limit spurious correlation.¹²⁸

129. Nevertheless, in his analysis of the correlation between targeted and non-targeted categories of CRTs, Dr. Leitzinger altogether ignores the potential for spurious correlation in CRT prices and makes no effort to remove the effects of common market forces that have nothing to do with the alleged cartel. The resulting spurious correlation embedded in Dr. Leitzinger's correlation analysis can be illuminated by examining the relationship between CRT prices and ozone depleting atmospheric substances such as atmospheric chlorine levels. Chlorine gas levels have declined consistently in recent years due to policies designed to protect the ozone layer. Because most CRT prices have also declined, when Dr. Leitzinger's approach is applied to data on CRT prices and atmospheric chlorine levels, it would inevitably find a high, positive correlation between the two.

130. This is illustrated in Exhibit 17, which shows the correlation coefficients between quarterly changes in atmospheric chlorine levels and the average prices of the most popular categories of CRTs since 1995.¹²⁹ Although clearly no one would claim that CRTs were linked by market forces to atmospheric chlorine levels, the fact that both were trending downwards is enough to produce positive correlation coefficients that exceeded 0.9 between prices of each category of CRT and atmospheric chlorine levels. Thus, Dr. Leitzinger's finding of a positive correlation between CRT prices is far from dispositive of the types of economic linkages between them that he posits in order to establish common impact.

(... footnote continued)

¹²⁸ Leitzinger Report, ¶ 43.

¹²⁹ The average price indices of popular categories of CPTs were constructed by Dr. Leitzinger and used in Leitzinger Report, Figure 8. Data on atmospheric chlorine levels are from the National Oceanic and Atmospheric Administration.

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131. Spurious correlation is not the only flaw in Dr. Leitzinger's price correlation analysis. The same analysis masks considerable heterogeneity in CRT price dynamics (described earlier) because the analysis is focused only on *average* CRT prices, i.e., CRT prices that have been aggregated across many different CRTs within broad categories. For example, Dr. Leitzinger's approach examines how the average price of all 21-inch CPT models (a category that he contends was directly targeted by the alleged cartel) was correlated over time with the average price of all 26-inch CPT models (a non-targeted CRT category, per Dr. Leitzinger).¹³⁰ Such an analysis masks the heterogeneity in price levels and price movements of hundreds of CRT models within each of these categories and it obscures the differentiated impact (if any) of the alleged cartel.

132. In order to test the alleged linkage between target prices and the disaggregated prices of CRTs in non-targeted categories, I examined whether the alleged target prices were reliable predictors of the prices paid by individual customers for individual CRT models in non-targeted CRT categories. Such analyses of disaggregated CRT price data reveal the extent of heterogeneity across products and class members, and they demonstrate the need for individualized inquiries to establish impact.

133. For example, I estimate a regression in which the price paid by each customer for each 34-inch CPT model (a non-targeted category) in a given quarter is the dependent variable and the alleged target prices of comparable¹³¹ 28-inch CPTs in the same quarter is the independent variable. The regression analysis reveals that a prediction of the average sales price paid by a particular customer for a particular 34-inch CPT model in a particular quarter, based on the alleged target price for comparable 28-inch CPTs, would be wrong by more than 5% at least 78% of the time, by more than 10% at least 58% of

¹³⁰ Leitzinger Report, Figures 6 and 9.

¹³¹ For the purpose of this analysis, a 28-inch CPT model is considered to be "comparable" to a 34-inch CPT model if both were produced by the same firm and had the same "finish" (i.e., bare or ITC).

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the time, and by more than 15% at least 41% of the time.¹³² These prediction errors are economically significant as evidenced by the fact that CRT manufacturers considered price differentials of 5% or less between manufacturers to be enough to shift sales and shares.¹³³ The prediction errors are also statistically significant at the 95% level.¹³⁴

134. I have conducted a similar analysis using target prices of other so-called targeted CPT categories (other than 28-inch CPTs) to predict prices of 34-inch CPTs and concluded that target prices of those other CPT categories fared even worse when predicting sales prices of 34-inch CPTs. I then extended this analysis to predict sales prices of CRTs in each of the non-targeted CRT categories. Exhibit 18 lists, for each non-targeted CRT category X, the probability of large prediction errors when predictions are based on target prices of the targeted CRT category that proved best at predicting sales prices of non-targeted category X. For example, since target prices of 28-inch CPTs did best at predicting sales prices of 34-inch CPTs, Exhibit 18 notes the probability of large prediction errors when predicting sales prices of 34-inch CPTs based on target prices for 28-inch CPTs: a prediction error of more than 5% at least 78% of the time, by more than 10% at least 58% of the time, and by more than 15% at least 41% of the time.¹³⁵ These are the minimum prediction error rates associated with 34-inch CPTs.

135. As shown in Exhibit 18, target prices identified by Dr. Leitzinger perform extremely poorly when predicting actual prices of most major categories of non-targeted

¹³² I have also conducted this analysis using contemporaneous and lagged values of target prices, and I find qualitatively similar results. For example, when predictions of 34-inch CPT sales prices are based on the contemporaneous and lagged values of target prices of comparable 28-inch CPTs, the prediction error rates are above 40% for errors of at least 5%, 10% or 15%.

¹³³ See *supra* note 54.

¹³⁴ Specifically, they are based on the 5% lower bound of the variance of the prediction error.

¹³⁵ Exhibit 18 lists only non-targeted CRT categories for which there exists at least one price prediction regression of the sort described above with a sample size that is no less than 20. For such CRT categories, results from only regressions with a sample of size at least 20 are used in Exhibit 18. Most non-targeted CDT categories are all excluded from this exhibit because they do not satisfy the sample size requirement.

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CRTs.¹³⁶ Specifically, for three of the four most popular non-targeted CPT sizes identified by Dr. Leitzinger (and which satisfied my sample size requirements for this analysis),¹³⁷ the minimum prediction error was no less than 5% at least 66% of the time, no less than 10% at least 38% of the time, and no less than 15% at least 19% of the time.¹³⁸ The weighted average prediction error rate across all non-targeted CRTs (which meet my sample size requirement) in Exhibit 18 at the 5% threshold is 62%, at the 10% threshold is 40% and at the 15% threshold it is 27%, as shown in Exhibit 18.

136. These prediction errors – based on disaggregated CPT price data – are wholly inconsistent with Dr. Leitzinger’s contention that sales prices of non-targeted CRTs were consistently affected by target prices of targeted CRTs.

137. Similar flaws afflict another price correlation analysis provided by Dr. Leitzinger as evidence of a price structure that implies that even non-targeted CRTs were affected by target prices set for targeted CRT categories.¹³⁹ In Figure 8 of his report, Dr. Leitzinger estimates pairwise correlation coefficients for average prices of major CRT categories. For example, he finds that quarterly average prices of 14-inch CPTs and 21-inch CPTs had a correlation coefficient of 0.95. However, the high correlation coefficients are misleading. They are subject to the problem of spurious correlation described earlier. Moreover, the analysis masks considerable heterogeneity in CRT price dynamics because the analysis is focused only on *average* CRT prices, i.e., CRT prices that have been aggregated across many different CRTs within broad categories. In order

¹³⁶ The analysis in Exhibit 18 is a conservative test of cartel effectiveness because the model attributes any co-movement between actual and alleged target prices to adherence by the alleged cartel when the co-movement may instead have been caused by changes in market forces that had a common impact on actual and target prices.

¹³⁷ The most popular non-targeted CPTs (i.e., those with the greatest dollar sales between 1995 and 2007) identified by Dr. Leitzinger are: 26-inch, 33-inch, 34-inch, 36-inch and 38-inch CPTs. Of these 33-inch CPTs do not meet my requirement of a minimum sample size of 20 observations for the prediction regressions.

¹³⁸ The remaining CPT category, 26-inch CPTs, also had a high minimum prediction error rate of 18% at the 5% threshold but a low one (1%) at the 10% threshold.

¹³⁹ Leitzinger Deposition, p. 148.

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to test the alleged linkage between prices of CRTs in various categories, I examined whether the average prices were reliable predictors of the prices paid by individual customers for individual CRT models in other CRT categories.

138. Exhibit 19 shows that in nearly every case, the average prices of CRT size categories were extremely poor predictors of the prices paid by individual customers for individual CRT models in other CRT size categories (and even in the same size category). For example, when the average quarterly prices of 21-inch CPTs are used to predict the prices of individual 14-inch CPT products paid by individual customers, there is a 76% probability that the prediction would be incorrect by more than 5%, a 54% chance that the prediction would be wrong by more than 10%, and a 36% chance that the prediction would be wrong by more than 15%. These prediction errors are statistically significant at the 5% level.¹⁴⁰

139. In sum, Dr. Leitzinger's correlation analyses mask the considerable heterogeneity in CRT price dynamics because of their focus on *average* CRT prices. Such aggregated analyses obscure material differences among products and class members and mask the difficulty of establishing class-wide impact through the use of common evidence. In contrast, analyses of disaggregated CRT price data reveal the extent of such heterogeneity and the need for individualized inquiries.

V. Pass-through of CRT Costs to Finished Products Prices Was Complex and Differentiated.

140. The proposed DPP class includes purchasers of CRTs as well as purchasers of CRT finished products. Even assuming *arguendo* that the alleged CRT cartel had a uniformly positive impact on the prices paid by direct purchasers of most or all CRTs during the class period, it likely would have had a uniformly positive impact on the prices paid by class members for *finished products* only if the increase in CRT prices flowed through to finished products purchased by class members in a uniformly positive manner.

¹⁴⁰ Specifically, they are based on the 5% lower bound of the variance of the prediction error.

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However, if manufacturers of finished products did not pass through cost changes for some products, for example, because of competition from other technologies, then some products included in the class analysis may not have been impacted and some DPP members may not have been harmed by the alleged cartel.

141. Economic theory shows that not all finished product prices would necessarily have been elevated and prices of some may even have fallen if the alleged cartel had been able to elevate prices of all CRTs. For example, suppose (contrary to evidence) that vertically integrated firms as well as un-integrated firms closely adhered to target CRT prices set by the alleged cartel, and as a consequence prices of all CRTs (*i.e.*, merchant as well as transfer prices) were significantly and permanently elevated. In this scenario, finished product manufacturers that sourced most of their CRTs from third-party CRT suppliers would have faced an increase in cost, and they may have increased the prices they charged for most of their TVs and monitors. However, vertically integrated CRT finished product manufacturers that self-supplied most of their CRTs may have been less likely to elevate their CRT TV and monitor prices, and may even have reduced those prices despite the elevation in CRT prices.

142. Economic theory also shows that the response of vertically integrated firms in this setting depends on technical economic conditions related to the nature of competition among CRT finished product manufacturers.¹⁴¹ In particular, if firms' price strategies are such that their prices are strategic substitutes rather than strategic complements, then vertically integrated manufacturers may actually reduce the prices of their finished products in response to price increases by rival manufacturers that procured CRTs primarily from unaffiliated CRT vendors. Whether firms' prices can be characterized as strategic complements or substitutes depends on a variety of market characteristics, and

¹⁴¹ See, *e.g.*, Bulow, J. I., J. D. Geanakoplos, and P. D. Klemperer. "Multimarket Oligopoly: Strategic Substitutes and Complements." *Journal of Political Economy*, Vol. 93, No. 3. (1985), pp. 488-511. An increase in the transfer price of CRTs sold within a vertically integrated finished product manufacturer need not represent an actual cost increase since it is a transfer between integrated entities, which makes it all the more likely that an integrated firm would not necessarily increase finished product prices in response to an elevation in CRT transfer prices.

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Dr. Leitzinger has performed no analysis as to whether these conditions had been met in the CRT finished products marketplace.

143. In addition, it might well have been the case that for some CRT products during some time periods, available substitute products based on other technology essentially set the competitive wholesale price, so that even if the component CRT's price were elevated there could and would be no pass-through to the wholesale buyer. From the accounting perspective, the product manufacturer or the wholesale supplier might no longer be covering their product's costs, but to the extent some of those costs are sunk it might remain good business to persist in selling the CRT product at its unchanged or even diminished market-driven price.

144. In fact, the data on record show that finished product manufacturers did not always pass-on even widespread changes in CRT costs, which indicates that the link between finished product prices and CRT costs was complex and non-uniform. For example, between Q4 2000 and Q1 2001, prices declined for 99.4% of CDTs sold.¹⁴² However, during the same time period, prices of nearly a third of CRT monitors sold increased or did not change. This implies that a substantial fraction of monitor price changes likely did not reflect CDT cost changes between Q4 2000 and Q1 2001. There is similar evidence that changes in CPT prices were often not passed-through to CRT TV prices. For example, between Q4 2001 and Q1 2002, prices decreased for over 85% of

¹⁴² More precisely, 99.4% of CDT unit sales were associated with CDTs whose prices declined between Q4 2000 and Q1 2001. The median CDT price change of -7.2% between Q4 2000 and Q1 2001 was substantially greater than the median CDT price change of -2.1% across all quarters for which data are available. Moreover, prices of more than 96% of CDT unit sales sold in Q2 2001 declined. Thus, the decline in CDT prices between Q4 2000 and Q1 2001 was not immediately reversed. (The CRT price changes noted here were not due to changes in the mix of products and customers because a "product" in a quarter was defined based on a unique combination of the following variables: manufacturer, model number, application (CPT or CDT), size, shape, finish (Bare/ITC) and bill-to/ship-to customer identity. The average price of a product thus identified in a given quarter is compared with the average price of the same product in the previous quarter.)

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CPTs.¹⁴³ However, during the same time period, prices of nearly two-thirds of CRT TVs sold increased or did not change.^{144, 145} This implies that a substantial fraction of CRT TV price changes potentially did not reflect CPT cost changes between Q4 2001 and Q1 2002. Thus, finished product manufacturers likely did not pass-through CRT cost changes in a significant number of instances even in time periods with broad CRT price changes.

A. A Corrected Version of Dr. Leitzinger's Pass-through Analysis Shows that Pass-through Rates Were Zero for Several Segments of CRT Finished Products.

145. Ignoring the variation in pass-through rates apparent in the available data, Dr. Leitzinger provides an estimate of the *average* pass-through rate of CRT costs to finished product prices – averaged across all finished products, manufacturers, and time periods. Specifically, in order to estimate pass-through rates of CRT costs to finished product prices, Dr. Leitzinger conducts a regression analysis where he estimates the relationship

¹⁴³ More precisely, over 85% of CPT unit sales were associated with CPTs whose prices declined between Q4 2001 and Q1 2002. The median CPT price change of -5.6% between Q4 2001 and Q1 2002 was substantially greater than the median CDT price change of -1.2% across all quarters for which data are available. Moreover, more than 76% of CPT unit sales in Q2 2002 were associated with CPTs whose prices declined. Thus, the decline in CPT prices between Q4 2001 and Q1 2002 was not immediately reversed.

¹⁴⁴ The pass-through analyses described in this paragraph were conducted using the worldwide CRT sales data and mostly North American finished product sales compiled by Dr. Leitzinger. A similar analysis using North American CPT sales data shows that prices of CPTs sold in North America declined broadly in Q1 2002 (just as they did worldwide). Specifically, 78% of CPT unit sales in North America were associated with CPTs whose prices declined between Q4 2001 and Q1 2002. The median CPT price change between Q4 2001 and Q1 2002 was -6.5%. (There were relatively few CDT sales with North American ship-to/bill-to addresses in available CRT sales data.)

¹⁴⁵ In his pass-through regressions, Dr. Leitzinger assumes that wholesale sales prices of finished products reflect contemporaneous wholesale costs, i.e., there is no lag in the reaction of prices to cost. I maintain the same assumption here. However, relaxing the assumption and allowing prices to respond with a lag of one quarter does not alter qualitative results. For example, as noted earlier, from Q4 2000 to Q1 2001, prices declined for 99.4% of CDTs sold and yet prices increased or did not change for about 30% of CRT monitors sold in Q2 2001 (weighted by sales). Similarly, from Q4 2001 to Q1 2002, prices declined for over 85% of CPTs sold, while prices increased or did not change for 74% of CRT TVs sold in Q2 2002 (sales volume weighted).

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between quarterly average prices of CRTs and contemporaneous average prices of finished products. He concludes that CRT prices are passed on to finished product prices at a high rate, such that a \$1 increase in CRT price is associated with more than a \$1 increase in the finished product price.¹⁴⁶ However, his analysis makes no effort to examine if the relationship between CRT price and finished product price (i.e., the pass-through rate) differs across various sizes of TVs, and across other categories of CRTs and finished products. In his deposition, Dr. Leitzinger acknowledged that his pass-through is an average across all types of CRTs and that it does not rule out the possibility that the pass-through rate for some CRTs could be zero.¹⁴⁷

146. Even as an estimate of average pass-through rates, Dr. Leitzinger's analysis is fundamentally flawed. A fundamental failing of his pass-through analysis is that it makes no effort to control for differences across products. Dr. Leitzinger's estimate of the average pass-through rate relies in large part on comparing the prices and costs of different CRT finished products. For example, his analysis of pass-through rates for TVs includes small TVs as well as large TVs. The logic of Dr. Leitzinger's pass-through regression is such that he would compare small and large TVs, and note that (a) CPTs for large TVs cost more, on average, than CPTs for small TVs, and (b) large TVs commanded higher prices than small TVs, on average. Based on this, Dr. Leitzinger's approach would estimate a positive pass-through rate.

147. However, the fact that manufacturers charged higher prices for TVs with higher-cost CPTs says nothing about how they would have responded to the alleged overcharge on a particular product. Dr. Leitzinger's approach potentially over-estimates average pass-through rates because he attributes the entire difference in the prices of these two

¹⁴⁶ Specifically, Dr. Leitzinger estimates a regression where the dependent variable is the quarterly weighted average price of CRT finished products classified by application, size, and manufacturer (e.g., the average price of 14-inch CRT TVs sold by Panasonic in a given quarter). The independent variables include the quarterly weighted average price of CRTs with the same application, size, and manufacturer. Other independent variables attempt to control for changes in market conditions.

¹⁴⁷ Leitzinger Deposition, p. 198.

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categories of TVs in this example to the difference in their tube costs. However, large TVs were more likely to be premium models with features such as high-definition resolution than were smaller TVs. For example, in Q1 2006, nearly 45% of large CRT TV units sold in North America were high-definition TVs, while only about 5% of small and medium-sized CRT TVs were high-definition TVs.¹⁴⁸ Large CRT TVs may have been priced higher, in part, because they were more likely to have premium features such as high-definition resolution for which customers were willing to pay more. In such cases, Dr. Leitzinger's approach would over-estimate pass-through rates because it assumes that the price difference between products is entirely attributable to the products' cost difference.

148. Thus, Dr. Leitzinger's approach likely over-estimates pass-through rates because he compares widely different products. I correct for this flaw and re-estimate pass-through rates. Specifically, I control for differences between finished products by the use of product fixed effects.¹⁴⁹

149. The resulting estimates of the pass-through rates for major categories of CRT finished products are no longer statistically distinguishable from zero at the 10%

¹⁴⁸ "Large" TVs are defined to be at least 30" in size, while the rest are classified as small and medium TVs. (Source: iSuppli Television Systems Market Tracker Database.) High-definition TVs were far more likely to be found among large TVs than among smaller TVs in all quarters from 2005 through 2007, according to iSuppli. (Data for earlier years were not available from iSuppli.)

¹⁴⁹ A standard econometric technique used when unobserved differences between products need to be controlled for in a "panel data" setting (i.e., in a dataset that has multiple products for multiple periods) is to include fixed effects (or "dummy variables") for individual products in the regression, as I do in my pass-through regressions (described in more detail in the Appendix). See, Davis, P., & Garcés, E. (2010). *Quantitative Techniques for Competition and Antitrust Analysis*. Princeton University Press. Section 2.2.3.1. The fixed effects I employ are specific, defined by unique combinations of manufacturer, application (TV/monitor), and size. For example, all SEA 17-inch monitors would be identified by a single dummy variable. I define fixed effects in this manner because Dr. Leitzinger, in his pass-through analysis, defines a finished "product" based on each unique combination of manufacturer, application (TV/monitor), and size; and my intent is to illustrate how even modest extensions to his pass-through models up-ends his results.

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significance level, as illustrated in Exhibit 20. For example, the pass-through rate for TVs is statistically not significant at the 10% level. Moreover, the pass-through rates for small and large TVs are not statistically significant at the 10% level, but the pass-through rate for medium-sized TVs is negative and statistically significant. (See Exhibit 20.)

150. Dr. Leitzinger's regression model of pass-through rates is likely flawed because it does not control for material changes in market conditions during the relevant period. For example, the cost of manufacturing finished products likely declined during the relevant period because TV and monitor manufacturers shifted production to low-cost countries.¹⁵⁰ Because Dr. Leitzinger's model does not control for this downward trend, if finished product manufacturers passed-through any of these cost declines at all, Dr. Leitzinger's model erroneously would attribute their pass-through of declining manufacturing costs as to pass-through of CRT price changes (which were also declining), resulting in an over-estimate of CRT cost pass-through rates. Even setting aside this likely problem with his approach, simply correcting his analysis for the lack of proper controls for cross-product differences in quality implies zero or negative pass-through rates for major categories of CRTs.¹⁵¹

¹⁵⁰ For example, many monitor manufacturers shifted production to China during the class period. "Production shift to China is progressing rapidly in Taiwan. Most of the monitor manufacturers in Taiwan are establishing production centers in China because it is becoming increasingly difficult to remain price competitive in Taiwan due to the rapid decline in prices." (*Flat Panel Display Applications: Trends and Forecasts*. (2001). Fuji Chimera Research Institute, translated by InterLingua, p. 212.) From 1999 to 2005, China's share of CDT monitor production increased from 32.5% to 81.9%. *Forecasts and Trends for Flat Panel Displays and Their Applications*. (2000). Fuji Chimera Research Institute, translated by InterLingua, p. 164; *Flat Panel Display Applications: Trends and Forecasts*. (2007). Fuji Chimera Research Institute, translated by InterLingua, p. 280.

¹⁵¹ Data problems such as poor measurement of the cost of CRTs associated with finished products might also explain non-positive pass-through rate estimates. However, such data limitations only point to the inadequacy of the data relied on by Dr. Leitzinger to estimate pass-through rates.

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VI. Estimating CRT Overcharges

151. In his report, Dr. Leitzinger proposes to compare CRT prices during the alleged cartel period with prices before and after the cartel period in order to estimate putative overcharges for CRTs.¹⁵² In his deposition, Dr. Leitzinger testified that he relies on his analysis of alleged CRT overcharges to opine that the alleged cartel had class-wide impact.¹⁵³ Thus, Dr. Leitzinger's CRT overcharge analysis is relevant for assessing impact as well as damages.

152. Dr. Leitzinger's proposed "before/after analysis" of CRT overcharges designates the period before Q2 1995 to be the "before period" and the period after Q1 2007 as the "after period." The alleged cartel period ranges from Q2 1995 through Q1 2007. However, Dr. Leitzinger makes a further distinction between a first conspiracy period between Q2 1995 and Q2 2006 when, in his view, the cartel was "in full force and effect," and a second conspiracy period between Q3 2006 and Q1 2007 with reduced cartel activity.¹⁵⁴

153. Dr. Leitzinger proceeds to estimate a regression model that compares the average prices of CRTs during the two cartel periods with the average price during the combined pre-cartel and post-cartel periods (the "benchmark period") after controlling for certain market factors that influenced CRT prices. He concludes that the cartel effectively elevated CRT prices during the first but not the second cartel period, resulting in CRT overcharges that ranged from 1.8% to 15.2% per quarter.¹⁵⁵ Dr. Leitzinger claims that his

¹⁵² Leitzinger Report, § VIII.

¹⁵³ Leitzinger Deposition, p. 190.

¹⁵⁴ Leitzinger Report, ¶ 70.

¹⁵⁵ Leitzinger Report, Figure 12. In Dr. Leitzinger's view, although the alleged cartel was ineffective during the second cartel period, the overcharges stemming from cartel actions taken during the first cartel period led to elevated CRT prices during the second cartel period because the impact of the alleged cartel on CRT prices dissipated only gradually. (Leitzinger Report, ¶ 74.)

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overcharge analysis has established that a formulaic approach to damages is feasible.¹⁵⁶ However, as I explain in this section, the formulaic approach proposed by Dr. Leitzinger to estimate average CRT overcharges masks considerable heterogeneity in the impact (if any) of the alleged cartel on CRT prices, and his approach shows that many CRT segments were unaffected by the alleged cartel.

Dr. Leitzinger's Own Data and Approach Show No Evidence of Overcharges for Major Categories of CRTs and No Aggregate Overcharges in North America.

154. Dr. Leitzinger's regression model of CRT overcharges pools together widely disparate types of CRTs. His analysis does not examine whether the alleged overcharges differed across various categories of CRTs. He makes no effort to determine if his estimated average overcharge is reasonably representative of overcharges paid by all or most DPP class members for disparate categories of CRTs. Moreover, Dr. Leitzinger did not estimate overcharges for CRTs sold in North America.¹⁵⁷ In fact, Dr. Leitzinger's own data and overcharge analysis demonstrate that average prices of large segments of CRTs were not higher during the conspiracy periods than during the benchmark period, i.e., there likely was no overcharge for many CRTs sold during the class period. Moreover, if Dr. Leitzinger's analysis is confined to just CRTs sold in North America, then his model shows that the average overcharge for all CRTs sold during the class period was zero and the average overcharge for CDTs sold during the class period was negative.

155. Specifically, when I apply Dr. Leitzinger's overcharge model to worldwide CRT sales data that he used, but separate CPTs from CDTs instead of pooling them together as he does, I find that average CDT prices during the two cartel periods were not statistically significantly (at the 10% level) different from CDT prices in the non-cartel benchmark

¹⁵⁶ Leitzinger Report, ¶¶ 67-68.

¹⁵⁷ In his deposition, Dr. Leitzinger acknowledged that he did not attempt to estimate overcharges for CDTs separately from CPTs, nor for CRTs sold in North America. (Leitzinger Deposition, pp. 169-70.)

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period. Thus, Dr. Leitzinger's own model and data show that prices of CDTs were not elevated by the alleged cartel. Exhibits 21A and 21B contain details of overcharges estimated by Dr. Leitzinger's model for CPTs and CDTs.¹⁵⁸

156. Furthermore, Dr. Leitzinger's overcharge model and data provide evidence of zero overcharges for certain categories of CPTs. Specifically, using his model and data to estimate overcharges for CPTs separately for CPTs of different sizes shows that prices of small CPTs during the cartel periods were not statistically significantly (at the 10% level) different from the benchmark period (i.e., there was no overcharge), and the same is true of large CPTs at the 5% significance level (although there is an overcharge at the 10% level).¹⁵⁹ (See Exhibits 21A and 21B for details.)

157. Although Dr. Leitzinger did not present any analyses of putative overcharges on North American CRT sales, I have applied his overcharge model separately to *CRTs sold to customers in North America*. When confined to North American CRT sales, Dr. Leitzinger's overcharge model estimates a zero average overcharge across all CRTs (pooled together) sold in North America. Moreover, when his model is further disaggregated and used to estimate overcharges separately for CPTs and CDTs sold in North America, overcharges for CPTs are found to be statistically no different from zero. Moreover, his model estimates a *negative* overcharge (statistically significant at the 1% level) for North American CDT sales. See Exhibits 21C and 21D for details.

¹⁵⁸ I have estimated Dr. Leitzinger's overcharge model separately for CDTs and CPTs, and this specification finds that the overcharge for CDTs is not statistically significant (at the 10%) level for both cartel periods identified by Dr. Leitzinger. In one of the analyses described in Exhibit 21B, I pooled CPTs and CDTs into a single dataset (as Dr. Leitzinger does) but then permitted the overcharge to differ across CPTs and CDTs by including in the regression a dummy variable indicator for CDTs and interacting it with the cartel period dummy indicator variables.

¹⁵⁹ "Small" CPTs are defined to be those with a diagonal length less than 20 inches, and "large" CPTs have a length of at least 30 inches. The remaining CPTs are defined as "medium-sized."

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Dr. Leitzinger's CRT Overcharge Model is Fundamentally Unsound.

158. Dr. Leitzinger's proposed approach to estimating even aggregate overcharges is fundamentally unsound. For his approach to be sound and reliable, it must appropriately control for the enormous changes that occurred in the CRT marketplace during the nearly 20 years between the early 1990s and the late 2000s that Dr. Leitzinger examines. By the late 2000s, CRTs had been largely displaced by LCDs, manufacturing costs had been altered by plant re-locations, and the mix of CRTs had changed substantially (with flat CPTs displacing curved CPTs, for example).¹⁶⁰ Most of these changes likely would have occurred even in the absence of the alleged cartel.

159. The soundness of the methodology Dr. Leitzinger proposes can be tested by comparing average CRT prices before and after the cartel. If Dr. Leitzinger's overcharge model is able reliably to isolate and estimate the impact of the alleged cartel's conduct on CRT prices and properly control for changes in market conditions, then his model would predict that the average CRT price in the pre-cartel period (i.e., prior to Q2 1995) and the post-cartel period (i.e., after Q1 2007) are comparable after controlling for differences in market conditions between the two periods. Alternatively, his model should predict that the average CRT price during the pre-cartel period should be lower than the average price in post-cartel period if post-cartel prices were elevated somewhat by the lingering effects of the cartel.

160. However, Dr. Leitzinger's overcharge model – when applied to global CRT sales data – shows that pre-cartel CRT prices were *higher* than post-cartel prices after controlling for the market factors included in Dr. Leitzinger's model. Furthermore, Dr. Leitzinger's model and data show that the pre-cartel period CRT average prices were higher than average prices during the alleged cartel periods, while the cartel periods' prices were above the post-cartel period prices. Put differently, Dr. Leitzinger's approach shows that the putative cartel simultaneously *lowered* the prices of CRTs relative to one

¹⁶⁰ See Exhibit 12, *supra* note 106 and *supra* note 150.

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of his benchmark periods (the pre-cartel period) even as it increased prices relative to the other benchmark period (the post-cartel period). (See Exhibit 21 for details.)

161. The likely explanation for this inconsistency is that market conditions changed materially over time, thereby driving CRTs prices down, and Dr. Leitzinger's model does not properly control for these changes and isolate the impact of the alleged cartel. It may be that his analysis improperly attributes some of the impact of these market changes to the alleged cartel, thereby overstating the impact of the alleged cartel. At a minimum, Dr. Leitzinger has not refuted this possibility.

162. Moreover, although Dr. Leitzinger's overcharge model includes a variable designed to capture the impact of LCD competition, it does not permit the impact of such competition to differ across various categories of CRTs, which again limits the usefulness of the model.¹⁶¹

163. In sum, Dr. Leitzinger is mistaken in his claim that his overcharge model proves the feasibility of a formulaic approach to reliably estimating damages.¹⁶² If anything, his data and his analysis demonstrate the need for a disaggregated analysis of impact and damages.

¹⁶¹ Specifically, his overcharge regression model (Leitzinger Report, Figure 11) includes a variable that measures quarterly shipments of LCDs by application (TVs/monitors). However, his model restricts the coefficient on this variable to be the same for both applications.

¹⁶² Leitzinger Report, ¶¶ 67-68.

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VII. Conclusions

164. Overall, it is my conclusion that the fact of impact on all (or almost all) of the members of the proposed DPP class from the alleged collusion among the defendant CRT producers cannot be established by means of common evidence. Prices of the different CRT finished products and CRTs changed very differently from each other from quarter to quarter and over the span of the class period, and this heterogeneity was due to substantially different market forces that applied to various CRT product segments at various points during the class period. Moreover, pass-through rates were not uniformly positive and a significant fraction of cost changes may not have been passed on to class members at all by some manufacturers. The substantial diversity of pricing levels and movements that is apparent from the pricing data shows that individualized inquiries would be necessary to assess whether most of the members of the proposed class were impacted by the alleged collusion.

165. Dr. Leitzinger's attempts to overcome this reality do not withstand scrutiny. He asserts that common proof is provided by the target price mechanism for coordinating the alleged cartel's CRT prices and that the alleged target prices he identifies cover 94% of CRT sales. In fact, the target prices he identifies cover only 17% of CRT sales. Moreover, empirical analysis of those 17% of sales demonstrates that there was an extremely weak relationship between changes in the target prices and changes in the actual prices. Dr. Leitzinger also puts forward a series of hedonic regressions to support his claim that the alleged conspiracy had classwide impact, but in his deposition frankly acknowledged that there is no logical way to adduce from such regressions evidence on class-wide impact.

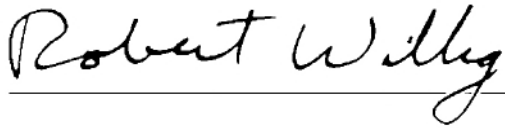
166. Finally, Dr. Leitzinger proffers a regression analysis relating CRT prices to selected control variables including one for a "pre-conspiracy period," one each for two "conspiracy periods," and one for a "post-conspiracy period." He finds that average worldwide CRT prices were somewhat higher during one of the conspiracy periods than during the combined non-conspiracy periods and claims that this contributes to proof of classwide impact and to the feasibility of a common formula for estimating damages. However, when his regression is limited to North American CRT sales instead of

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worldwide CRT sales, the measure of impact goes away. When his regression is disaggregated by treating global sales of CPTs and CDTs separately (since there are overwhelmingly different fact patterns surrounding them), the measure of impact on CDT prices goes away. When his regression is disaggregated to allow pricing to be different during the pre-conspiracy and post-conspiracy periods, the measure of impact reverses and pricing is seen to be lower during the conspiracy period than during the pre-conspiracy period. Thus, as put forward, the Dr. Leitzinger's overcharge model creates false positives for North American sales, for CDT sales, and for sales throughout the entire alleged conspiracy period. In other words, there is no evidence with any validity that supports any theory of classwide impact and common damages methodology.

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I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief. This declaration was executed on the 10th day of September 2013 in Princeton, New Jersey.

A handwritten signature in black ink, reading "Robert Willig", written over a horizontal line.

Robert D. Willig

Attachment 1: Curriculum Vitae

Name: **Robert D. Willig**

Address: 220 Ridgeview Road, Princeton, New Jersey 08540

Birth: 1/16/47; Brooklyn, New York

Marital Status: Married, four children

Education: Ph.D. Economics, Stanford University, 1973
Dissertation: Welfare Analysis of Policies
Affecting Prices and Products.
Advisor: James Rosse

M.S. Operations Research, Stanford University, 1968.

A.B. Mathematics, Harvard University, 1967.

Professional Positions:

Professor of Economics and Public Affairs, Princeton University, 1978-.

Principal External Advisor, Infrastructure Program, Inter-American Development Bank, 6/97-8/98.

Deputy Assistant Attorney General, U.S. Department of Justice, 1989-1991.

Supervisor, Economics Research Department, Bell Laboratories, 1977-1978.

Visiting Lecturer (with rank of Associate Professor), Department of Economics and Woodrow Wilson School, Princeton University, 1977-78 (part time).

Economics Research Department, Bell Laboratories, 1973-77.

Lecturer, Economics Department, Stanford University, 1971-73.

Other Professional Activities:

ABA Section of Antitrust Law Economics Task Force, 2010-2012

Advisory Committee, Compass Lexecon 2010 -,

OECD Advisory Council for Mexican Economic Reform, 2008 -2009,

Senior Consultant, Compass Lexecon, 2008 -,

Director, Competition Policy Associates, Inc., 2003-2005

Advisory Board, Electronic Journal of Industrial Organization and Regulation Abstracts, 1996-.

Advisory Board, Journal of Network Industries, 2004-.

Visiting Faculty Member (occasional), International Program on Privatization and Regulatory Reform, Harvard Institute for International Development, 1996-2000.

Member, National Research Council Highway Cost Allocation Study Review Committee, 1995-98.

Member, Defense Science Board Task Force on the Antitrust Aspects of Defense Industry Consolidation, 1993-94.

Editorial Board, Utilities Policy, 1990-2001

Leif Johanson Lecturer, University of Oslo, November 1988.

Member, New Jersey Governor's Task Force on Market-Based Pricing of Electricity, 1987-89.

Co-editor, Handbook of Industrial Organization, 1984-89.

Associate Editor, Journal of Industrial Economics, 1984-89.

Director, Consultants in Industry Economics, Inc., 1983-89, 1991-94.

Fellow, Econometric Society, 1981-.

Organizing Committee, Carnegie-Mellon-N.S.F. Conference on Regulation, 1985.

Board of Editors, American Economic Review, 1980-83.

Nominating Committee, American Economic Association, 1980-1981.

Research Advisory Committee, American Enterprise Institute, 1980-1986.

Editorial Board, M.I.T. Press Series on Government Regulation of Economic Activity, 1979-93.

Program Committee, 1980 World Congress of the Econometric Society.

Program Committee, Econometric Society, 1979, 1981, 1985.

Organizer, American Economic Association Meetings: 1980, 1982.

American Bar Association Section 7 Clayton Act Committee, 1981.

Principal Investigator, NSF grant SOC79-0327, 1979-80; NSF grant 285-6041, 1980-82; NSF grant SES-8038866, 1983-84, 1985-86.

Aspen Task Force on the Future of the Postal Service, 1978-80.

Organizing Committee of Sixth Annual Telecommunications Policy Research Conference, 1977-78.

Visiting Fellow, University of Warwick, July 1977.

Institute for Mathematical Studies in the Social Sciences, Stanford University, 1975.

Published Articles and Book Chapters:

"The Liftoff of Consumer Benefits from the Broadband Revolution" (with Mark Dutz and Jon Orszag), Review of Network Economics (2012) vol. 11, issue 4, article 2.

"Competition and innovation-driven inclusive growth" (with Mark Dutz, Ioannis Kessides and Stephen O'Connell), in Promoting Inclusive Growth: Challenges and Policies, Luiz de Mello and Mark Dutz (eds.), OECD, 2011.

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“Economic Effects of Antidumping Policy,” reprinted in The WTO and Anti-Dumping, Douglas Nelson (ed.), Edward Elgar, 2005.

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“Entrepreneurship, Access Policy and Economic Development: Lessons from Industrial Organization,” (with M. Dutz and J. Ordovery), European Economic Review, (44)4-6 (2000), pp. 739-747.

"Public Versus Regulated Private Enterprise," reprinted in Privatization in Developing Countries, P. Cook and C. Kirkpatrick (eds.), Edward Elgar, 2000.

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Invited Conference Presentations:

Brookings Institution Conference on The Economics of the Airline Industry "Airline Network Effects and Consumer Welfare"	2012
AGEP Public Policy Conference on Pharmaceutical Industry Economics, Regulation and Legal Issues; Law and Economics Center, George Mason University School of Law "Pharmaceutical Brand-Generic Disputes"	2012
U.S.-EU Alliance Study Peer Review Conferences "Review of Cooperative Agreements in Transatlantic Airline Markets"	2012
"The Research Agenda Ahead"	2012
Antitrust in the High Tech Sector Conference "Developments in Merger Enforcement"	2012
Georgetown Center for Business and Public Policy, Conference on the Evolution of Regulation "Reflections on Regulation"	2011
Antitrust Forum, New York State Bar Association "Upward Price Pressure, Market Definition and Supply Mobility"	2011
American Bar Association, Antitrust Section, Annual Convention "The New Merger Guidelines' Analytic Highlights"	2011
OECD and World Bank Conference on Challenges and Policies for Promoting Inclusive Growth "Inclusive Growth From Competition and Innovation"	2011
Villanova School of Business Executive MBA Conference "Airline Network Effects, Competition and Consumer Welfare"	2011
NYU School of Law Conference on Critical Directions in Antitrust "Unilateral Competitive Effects"	2010
Conf. on the State of European Competition Law and Enforcement in a Transatlantic Context "Recent Developments in Merger Control"	2010
Center on Regulation and Competition, Universidad de Chile Law School "Economic Regulation and the Limits of Antitrust Law"	2010
Center on Regulation and Competition, Universidad de Chile Law School "Merger Policy and Guidelines Revision"	2010
Faculty of Economics, Universidad de Chile	

"Network Effects in Airlines Markets"	2010
Georgetown Law Global Antitrust Enforcement Symposium "New US Merger Guidelines"	2010
FTI London Financial Services Conference "Competition and Regulatory Reform"	2010
NY State Bar Association Annual Antitrust Conference "New Media Competition Policy"	2009
Antitrust Law Spring Meeting of the ABA "Antitrust and the Failing Economy Defense"	2009
Georgetown Law Global Antitrust Enforcement Symposium "Mergers: New Enforcement Attitudes in a Time of Economic Challenge"	2009
Phoenix Center US Telecoms Symposium "Assessment of Competition in the Wireless Industry"	2009
FTC and DOJ Horizontal Merger Guidelines Workshop "Direct Evidence is No Magic Bullet"	2009
Northwestern Law Research Symposium: Antitrust Economics and Competition Policy "Discussion of Antitrust Evaluation of Horizontal Mergers"	2008
Inside Counsel Super-Conference "Navigating Mixed Signals under Section 2 of the Sherman Act"	2008
Federal Trade Commission Workshop on Unilateral Effects in Mergers "Best Evidence and Market Definition"	2008
European Policy Forum, Rules for Growth: Telecommunications Regulatory Reform "What Kind of Regulation For Business Services?"	2007
Japanese Competition Policy Research Center, Symposium on M&A and Competition Policy "Merger Policy Going Forward With Economics and the Economy"	2007
Federal Trade Commission and Department of Justice Section 2 Hearings "Section 2 Policy and Economic Analytic Methodologies"	2007
Pennsylvania Bar Institute, Antitrust Law Committee CLE "The Economics of Resale Price Maintenance and Class Certification"	2007
Pennsylvania Bar Institute, Antitrust Law Committee CLE	

“Antitrust Class Certification – An Economist’s Perspective”	2007
Fordham Competition Law Institute, International Competition Economics Training Seminar “Monopolization and Abuse of Dominance”	2007
Canadian Bar Association Annual Fall Conference on Competition Law “Economic Tools for the Competition Lawyer”	2007
Conference on Managing Litigation and Business Risk in Multi-jurisdiction Antitrust Matters “Economic Analysis in Multi-jurisdictional Merger Control”	2007
World Bank Conference on Structuring Regulatory Frameworks for Dynamic and Competitive South Eastern European Markets “The Roles of Government Regulation in a Dynamic Economy”	2006
Department of Justice/Federal Trade Commission Section 2 Hearings “(Allegedly) Monopolizing Tying Via Product Innovation”	2006
Fordham Competition Law Institute, Competition Law Seminar “Monopolization and Abuse of Dominance”	2006
Practicing Law Institute on Intellectual Property Antitrust “Relevant Markets for Intellectual Property Antitrust”	2006
PLI Annual Antitrust Law Institute “Cutting Edge Issues in Economics”	2006
World Bank’s Knowledge Economy Forum V “Innovation, Growth and Competition”	2006
Charles University Seminar Series “The Dangers of Over-Ambitious Antitrust Regulation”	2006
NY State Bar Association Antitrust Law Section Annual Meeting “Efficient Integration or Illegal Monopolization?”	2006
World Bank Seminar “The Dangers of Over-Ambitious Regulation”	2005
ABA Section of Antitrust Law 2005 Fall Forum “Is There a Gap Between the Guidelines and Agency Practice?”	2005
Hearing of Antitrust Modernization Commission “Assessment of U.S. Merger Enforcement Policy”	2005

LEAR Conference on Advances in the Economics of Competition Law “Exclusionary Pricing Practices”	2005
Annual Antitrust Law Institute “Cutting Edge Issues in Economics”	2005
PRIOR Symposium on States and Stem Cells “Assessing the Economics of State Stem Cell Programs”	2005
ABA Section of Antitrust Law – AALS Scholars Showcase “Distinguishing Anticompetitive Conduct”	2005
Allied Social Science Associations National Convention “Antitrust in the New Economy”	2005
ABA Section of Antitrust Law 2004 Fall Forum “Advances in Economic Analysis of Antitrust”	2004
Phoenix Center State Regulator Retreat “Regulatory Policy for the Telecommunications Revolution”	2004
OECD Competition Committee “Use of Economic Evidence in Merger Control”	2004
Justice Department/Federal Trade Commission Joint Workshop “Merger Enforcement”	2004
Phoenix Center Annual U.S. Telecoms Symposium “Incumbent Market Power”	2003
Center for Economic Policy Studies Symposium on Troubled Industries “What Role for Government in Telecommunications?”	2003
Princeton Workshop on Price Risk and the Future of the Electric Markets “The Structure of the Electricity Markets”	2003
2003 Antitrust Conference “International Competition Policy and Trade Policy”	2003
International Industrial Organization Conference “Intellectual Property System Reform”	2003
ABA Section of Antitrust Law 2002 Fall Forum “Competition, Regulation and Pharmaceuticals”	2002

Fordham Conference on International Antitrust Law and Policy	
“Substantive Standards for Mergers and the Role of Efficiencies”	2002
Department of Justice Telecom Workshop	
“Stimulating Investment and the Telecommunications Act of 1996”	2002
Department of Commerce Conference on the State of the Telecom Sector	
“Stimulating Investment and the Telecommunications Act of 1996”	2002
Law and Public Affairs Conference on the Future of Internet Regulation	
“Open Access and Competition Policy Principles”	2002
Center for Economic Policy Studies Symposium on Energy Policy	
“The Future of Power Supply”	2002
The Conference Board: Antitrust Issues in Today’s Economy	
“The 1982 Merger Guidelines at 20”	2002
Federal Energy Regulatory Commission Workshop	
“Effective Deregulation of Residential Electric Service”	2001
IPEA International Seminar on Regulation and Competition	
“Electricity Markets: Deregulation of Residential Service”	2001
“Lessons for Brazil from Abroad”	2001
ABA Antitrust Law Section Task Force Conference	
“Time, Change, and Materiality for Monopolization Analyses”	2001
Harvard University Conference on American Economic Policy in the 1990s	
“Comments on Antitrust Policy in the Clinton Administration”	2001
Tel-Aviv Workshop on Industrial Organization and Anti-Trust	
“The Risk of Contagion from Multimarket Contact”	2001
2001 Antitrust Conference	
“Collusion Cases: Cutting Edge or Over the Edge?”	2001
“Dys-regulation of California Electricity”	2001
FTC Public Workshop on Competition Policy for E-Commerce	
“Necessary Conditions for Cooperation to be Problematic”	2001
HIID International Workshop on Infrastructure Policy	
“Infrastructure Privatization and Regulation”	2000
Villa Mondragone International Economic Seminar	
“Competition Policy for Network and Internet Markets”	2000

New Developments in Railroad Economics: Infrastructure Investment and Access Policies “Railroad Access, Regulation, and Market Structure”	2000
The Multilateral Trading System at the Millennium “Efficiency Gains From Further Liberalization”	2000
Singapore – World Bank Symposium on Competition Law and Policy “Policy Towards Cartels and Collusion”	2000
CEPS: Is It a New World?: Economic Surprises of the Last Decade “The Internet and E-Commerce”	2000
Cutting Edge Antitrust: Issues and Enforcement Policies “The Direction of Antitrust Entering the New Millennium”	2000
The Conference Board: Antitrust Issues in Today’s Economy “Antitrust Analysis of Industries With Network Effects”	1999
CEPS: New Directions in Antitrust “Antitrust in a High-Tech World”	1999
World Bank Meeting on Competition and Regulatory Policies for Development “Economic Principles to Guide Post-Privatization Governance”	1999
1999 Antitrust Conference “Antitrust and the Pace of Technological Development” “Restructuring the Electric Utility Industry”	1999 1999
HIID International Workshop on Privatization, Regulatory Reform and Corporate Governance “Privatization and Post-Privatization Regulation of Natural Monopolies”	1999
The Federalist Society: Telecommunications Deregulation: Promises Made, Potential Lost? “Grading the Regulators”	1999
Inter-American Development Bank: Second Generation Issues In the Reform Of Public Services “Post-Privatization Governance” “Issues Surrounding Access Arrangements”	1999 1999
Economic Development Institute of the World Bank -- Program on Competition Policy “Policy Towards Horizontal Mergers”	1998
Twenty-fifth Anniversary Seminar for the Economic Analysis Group of the Department of	

Justice		
“Market Definition in Antitrust Analysis”		1998
HIID International Workshop on Privatization, Regulatory Reform and Corporate Governance		
“Infrastructure Architecture and Regulation: Railroads”		1998
EU Committee Competition Conference – Market Power		
“US/EC Perspective on Market Definition”		1998
Federal Trade Commission Roundtable		
“Antitrust Policy for Joint Ventures”		1998
1998 Antitrust Conference		
“Communications Mergers”		1998
The Progress and Freedom Foundation Conference on Competition, Convergence, and the Microsoft Monopoly		
Access and Bundling in High-Technology Markets		1998
FTC Program on The Effective Integration of Economic Analysis into Antitrust Litigation		
The Role of Economic Evidence and Testimony		1997
FTC Hearings on Classical Market Power in Joint Ventures		
Microeconomic Analysis and Guideline		1997
World Bank Economists --Week IV Keynote		
Making Markets More Effective With Competition Policy		1997
Brookings Trade Policy Forum		
Competition Policy and Antidumping: The Economic Effects		1997
University of Malaya and Harvard University Conference on The Impact of Globalisation and Privatisation on Malaysia and Asia in the Year 2020		
Microeconomics, Privatization, and Vertical Integration		1997
ABA Section of Antitrust Law Conference on The Telecommunications Industry		
Current Economic Issues in Telecommunications		1997
Antitrust 1998: The Annual Briefing		
The Re-Emergence of Distribution Issues		1997
Inter-American Development Bank Conference on Private Investment, Infrastructure Reform and Governance in Latin America & the Caribbean		
Economic Principles to Guide Post-Privatization Governance		1997

Harvard Forum on Regulatory Reform and Privatization of Telecommunications in the Middle East	
Privatization: Methods and Pricing Issues	1997
American Enterprise Institute for Public Policy Research Conference	
Discussion of Local Competition and Legal Culture	1997
Harvard Program on Global Reform and Privatization of Public Enterprises	
“Infrastructure Privatization and Regulation: Freight”	1997
World Bank Competition Policy Workshop	
“Competition Policy for Entrepreneurship and Growth”	1997
Eastern Economics Association Paul Samuelson Lecture	
“Bottleneck Access in Regulation and Competition Policy”	1997
ABA Annual Meeting, Section of Antitrust Law	
“Antitrust in the 21st Century: The Efficiencies Guidelines”	1997
Peruvian Ministry of Energy and Mines Conference on Regulation of Public Utilities	
“Regulation: Theoretical Context and Advantages vs. Disadvantages”	1997
The FCC: New Priorities and Future Directions	
“Competition in the Telecommunications Industry”	1997
American Enterprise Institute Studies in Telecommunications Deregulation	
“The Scope of Competition in Telecommunications”	1996
George Mason Law Review Symposium on Antitrust in the Information Revolution	
“Introduction to the Economic Theory of Antitrust and Information”	1996
Korean Telecommunications Public Lecture	
“Market Opening and Fair Competition”	1996
Korea Telecommunications Forum	
“Desirable Interconnection Policy in a Competitive Market”	1996
European Association for Research in Industrial Economics Annual Conference	
“Bottleneck Access: Regulation and Competition Policy”	1996
Harvard Program on Global Reform and Privatization of Public Enterprises	
“Railroad and Other Infrastructure Privatization”	1996

FCC Forum on Antitrust and Economic Issues Involved with InterLATA Entry “The Scope of Telecommunications Competition”	1996
Citizens for a Sound Economy Policy Watch on Telecommunications Interconnection “The Economics of Interconnection”	1996
World Bank Seminar on Experiences with Corporatization “Strategic Directions of Privatization”	1996
FCC Economic Forum on the Economics of Interconnection Lessons from Other Industries	1996
ABA Annual Meeting, Section of Antitrust Law The Integration, Disintegration, and Reintegration of the Entertainment Industry	1996
Conference Board: 1996 Antitrust Conference How Economics Influences Antitrust and Vice Versa	1996
Antitrust 1996: A Special Briefing Joint Ventures and Strategic Alliances	1996
New York State Bar Association Section of Antitrust Law Winter Meeting Commentary on Horizontal Effects Issues	1996
FTC Hearings on the Changing Nature of Competition in a Global and Innovation-Driven Age Vertical Issues for Networks and Standards	1995
Wharton Seminar on Applied Microeconomics Access Policies with Imperfect Regulation	1995
Antitrust 1996, Washington D.C. Assessing Joint Ventures for Diminution of Competition	1995
ABA Annual Meeting, Section of Antitrust Law Refusals to Deal -- Economic Tests for Competitive Harm	1995
FTC Seminar on Antitrust Enforcement Analysis Diagnosing Collusion Possibilities	1995
Philadelphia Bar Education Center: Antitrust Fundamentals Antitrust--The Underlying Economics	1995
Vanderbilt University Conference on Financial Markets	

Why Do Christie and Schultz Infer Collusion From Their Data?	1995
ABA Section of Antitrust Law Chair=s Showcase Program Discussion of Telecommunications Competition Policy	1995
Conference Board: 1995 Antitrust Conference Analysis of Mergers and Joint Ventures	1995
ABA Conference on The New Antitrust: Policy of the '90s Antitrust on the Super Highways/Super Airways	1994
ITC Hearings on The Economic Effects of Outstanding Title VII Orders "The Economic Impacts of Antidumping Policies"	1994
OECD Working Conference on Trade and Competition Policy "Empirical Evidence on The Nature of Anti-dumping Actions"	1994
Antitrust 1995, Washington D.C. "Rigorous Antitrust Standards for Distribution Arrangements"	1994
ABA -- Georgetown Law Center: Post Chicago-Economics: New Theories - New Cases? "Economic Foundations for Vertical Merger Guidelines"	1994
Conference Board: Antitrust Issues in Today's Economy "New Democrats, Old Agencies: Competition Law and Policy"	1994
Federal Reserve Board Distinguished Economist Series "Regulated Private Enterprise Versus Public Enterprise"	1994
Institut d'Etudes Politiques de Paris "Lectures on Competition Policy and Privatization"	1993
Canadian Bureau of Competition Policy Academic Seminar Series, Toronto. "Public Versus Regulated Private Enterprise"	1993
CEPS Symposium on The Clinton Administration: A Preliminary Report Card "Policy Towards Business"	1993
Columbia Institute for Tele-Information Conference on Competition in Network Industries, New York, NY "Discussion of Deregulation of Networks: What Has Worked and What Hasn't"	1993
World Bank Annual Conference on Development Economics "Public Versus Regulated Private Enterprise"	1993

Center for Public Utilities Conference on Current Issues Challenging the Regulatory Process	
"The Economics of Current Issues in Telecommunications Regulation"	1992
"The Role of Markets in Presently Regulated Industries"	1992
The Conference Board's Conference on Antitrust Issues in Today's Economy, New York, NY	
"Antitrust in the Global Economy"	1992
"Monopoly Issues for the '90s"	1993
Columbia University Seminar on Applied Economic Theory, New York, NY	
"Economic Rationales for the Scope of Privatization"	1992
Howrey & Simon Conference on Antitrust Developments, Washington, DC	
"Competitive Effects of Concern in the Merger Guidelines"	1992
Arnold & Porter Colloquium on Merger Enforcement, Washington, DC	
"The Economic Foundations of the Merger Guidelines"	1992
American Bar Association, Section on Antitrust Law Leadership Council Conference, Monterey, CA	
"Applying the 1992 Merger Guidelines"	1992
OECD Competition Policy Meeting, Paris, France	
"The Economic Impacts of Antidumping Policy"	1992
Center for Public Choice Lecture Series, George Mason University Arlington, VA	
"The Economic Impacts of Antidumping Policy"	1992
Brookings Institution Microeconomics Panel, Washington, DC,	
"Discussion of the Evolution of Industry Structure"	1992
AT&T Conference on Antitrust Essentials	
"Antitrust Standards for Mergers and Joint Ventures"	1991
ABA Institute on The Cutting Edge of Antitrust: Market Power	
"Assessing and Proving Market Power: Barriers to Entry"	1991
Second Annual Workshop of the Competition Law and Policy Institute of New Zealand	
"Merger Analysis, Industrial Organization Theory, and Merger Guidelines"	1991
"Exclusive Dealing and the <u>Fisher & Paykel</u> Case"	1991
Special Seminar of the New Zealand Treasury	
"Strategic Behavior, Antitrust, and The Regulation of Natural Monopoly"	1991

Public Seminar of the Australian Trade Practices Commission "Antitrust Issues of the 1990's"	1991
National Association of Attorneys General Antitrust Seminar "Antitrust Economics"	1991
District of Columbia Bar's 1991 Annual Convention "Administrative and Judicial Trends in Federal Antitrust Enforcement"	1991
ABA Spring Meeting "Antitrust Lessons From the Airline Industry"	1991
Conference on The Transition to a Market Economy - Institutional Aspects "Anti-Monopoly Policies and Institutions"	1991
Conference Board's Thirtieth Antitrust Conference "Antitrust Issues in Today's Economy"	1991
American Association for the Advancement of Science Annual Meeting "Methodologies for Economic Analysis of Mergers"	1991
General Seminar, Johns Hopkins University "Economic Rationales for the Scope of Privatization"	1991
Capitol Economics Speakers Series "Economics of Merger Guidelines"	1991
CRA Conference on Antitrust Issues in Regulated Industries "Enforcement Priorities and Economic Principles"	1990
Pepper Hamilton & Scheetz Anniversary Colloquium "New Developments in Antitrust Economics"	1990
PLI Program on Federal Antitrust Enforcement in the 90's "The Antitrust Agenda of the 90's"	1990
FTC Distinguished Speakers Seminar "The Evolving Merger Guidelines"	1990
The World Bank Speakers Series "The Role of Antitrust Policy in an Open Economy"	1990
Seminar of the Secretary of Commerce and Industrial Development of Mexico "Transitions to a Market Economy"	1990

Southern Economics Association	
"Entry in Antitrust Analysis of Mergers"	1990
"Discussion of Strategic Investment and Timing of Entry"	1990
American Enterprise Institute Conference on Policy Approaches to the Deregulation of Network Industries	
"Discussion of Network Problems and Solutions"	1990
American Enterprise Institute Conference on Innovation, Intellectual Property, and World Competition	
"Law and Economics Framework for Analysis"	1990
Banco Nacional de Desenvolvimento Economico Social Lecture	
"Competition Policy: Harnessing Private Interests for the Public Interest"	1990
Western Economics Association Annual Meetings	
"New Directions in Antitrust from a New Administration"	1990
"New Directions in Merger Enforcement: The View from Washington"	1990
Woodrow Wilson School Alumni Colloquium	
"Microeconomic Policy Analysis and Antitrust--Washington 1990"	1990
Arnold & Porter Lecture Series	
"Advocating Competition"	1991
"Antitrust Enforcement"	1990
ABA Antitrust Section Convention	
"Recent Developments in Market Definition and Merger Analysis"	1990
Federal Bar Association	
"Joint Production Legislation: Competitive Necessity or Cartel Shield?"	1990
Pew Charitable Trusts Conference	
"Economics and National Security"	1990
ABA Antitrust Section Midwinter Council Meeting	
"Fine-tuning the Merger Guidelines"	1990
"The State of the Antitrust Division"	1991
International Telecommunications Society Conference	
"Discussion of the Impact of Telecommunications in the UK"	1989
The Economists of New Jersey Conference	
"Recent Perspectives on Regulation"	1989

Conference on Current Issues Challenging the Regulatory Process	
"Innovative Pricing and Regulatory Reform"	1989
"Competitive Wheeling"	1989
Conference Board: Antitrust Issues in Today's Economy	
"Foreign Trade Issues and Antitrust"	1989
McKinsey & Co. Mini-MBA Conference	
"Economic Analysis of Pricing, Costing, and Strategic Business Behavior"	1989
	1994
Olin Conference on Regulatory Mechanism Design	
"Revolutions in Regulatory Theory and Practice: Exploring The Gap"	1989
University of Dundee Conference on Industrial Organization and Strategic Behavior	
"Mergers in Differentiated Product Industries"	1988
Leif Johanson Lectures at the University of Oslo	
"Normative Issues in Industrial Organization"	1988
Mergers and Competitiveness: Spain Facing the EEC	
"Merger Policy"	1988
"R&D Joint Ventures"	1988
New Dimensions in Pricing Electricity	
"Competitive Pricing and Regulatory Reform"	1988
Program for Integrating Economics and National Security: Second Annual Colloquium	
"Arming Decisions Under Asymmetric Information"	1988
European Association for Research in Industrial Economics	
"U.S. Railroad Deregulation and the Public Interest"	1987
"Economic Rationales for the Scope of Privatization"	1989
"Discussion of Licensing of Innovations"	1990
Annenberg Conference on Rate of Return Regulation in the Presence of Rapid Technical Change	
"Discussion of Regulatory Mechanism Design in the Presence of Research, Innovation, and Spillover Effects"	1987
Special Brookings Papers Meeting	
"Discussion of Empirical Approaches to Strategic Behavior"	1987
"New Merger Guidelines"	1990
Deregulation or Regulation for Telecommunications in the 1990's	
"How Effective are State and Federal Regulations?"	1987

Conference Board Roundtable on Antitrust	
"Research and Production Joint Ventures"	1990
"Intellectual Property and Antitrust"	1987
Current Issues in Telephone Regulation	
"Economic Approaches to Market Dominance: Applicability of Contestable Markets"	1987
Harvard Business School Forum on Telecommunications	
"Regulation of Information Services"	1987
The Fowler Challenge: Deregulation and Competition in The Local Telecommunications Market	
"Why Reinvent the Wheel?"	1986
World Bank Seminar on Frontiers of Economics	
"What Every Economist Should Know About Contestable Markets"	1986
Bell Communications Research Conference on Regulation and Information	
"Fuzzy Regulatory Rules"	1986
Karl Eller Center Forum on Telecommunications	
"The Changing Economic Environment in Telecommunications: Technological Change and Deregulation"	1986
Railroad Accounting Principles Board Colloquium	
"Contestable Market Theory and ICC Regulation"	1986
Canadian Embassy Conference on Current Issues in Canadian -- U.S. Trade and Investment	
"Regulatory Revolution in the Infrastructure Industries"	1985
Eagleton Institute Conference on Telecommunications in Transition	
"Industry in Transition: Economic and Public Policy Overview"	1985
Brown University Citicorp Lecture	
"Logic of Regulation and Deregulation"	1985
Columbia University Communications Research Forum	
"Long Distance Competition Policy"	1985
American Enterprise Institute Public Policy Week	
"The Political Economy of Regulatory Reform"	1984
MIT Communications Forum	
"Deregulation of AT&T Communications"	1984

Bureau of Census Longitudinal Establishment Data File and Diversification Study Conference "Potential Uses of The File"	1984
Federal Bar Association Symposium on Joint Ventures "The Economics of Joint Venture Assessment"	1984
Hoover Institute Conference on Antitrust "Antitrust for High-Technology Industries"	1984
NSF Workshop on Predation and Industrial Targeting "Current Economic Analysis of Predatory Practices"	1983
The Institute for Study of Regulation Symposium: Pricing Electric, Gas, and Telecommunications Services Today and for the Future "Contestability As A Guide for Regulation and Deregulation"	1984
University of Pennsylvania Economics Day Symposium "Contestability and Competition: Guides for Regulation and Deregulation"	1984
Pinhas Sapir Conference on Economic Policy in Theory and Practice "Corporate Governance and Market Structure"	1984
Centre of Planning and Economic Research of Greece "Issues About Industrial Deregulation"	1984
"Contestability: New Research Agenda"	1984
Hebrew and Tel Aviv Universities Conference on Public Economics "Social Welfare Dominance Extended and Applied to Excise Taxation"	1983
NBER Conference on Industrial Organization and International Trade "Perspectives on Horizontal Mergers in World Markets"	1983
Workshop on Local Access: Strategies for Public Policy "Market Structure and Government Intervention in Access Markets"	1982
NBER Conference on Strategic Behavior and International Trade "Industrial Strategy with Committed Firms: Discussion"	1982
Columbia University Graduate School of Business, Conference on Regulation and New Telecommunication Networks "Local Pricing in a Competitive Environment"	1982
International Economic Association Roundtable Conference on New Developments in the Theory of Market Structure	

"Theory of Contestability"	1982
"Product Dev., Investment, and the Evolution of Market Structures"	1982
N.Y.U. Conference on Competition and World Markets: Law and Economics	
"Competition and Trade Policy--International Predation"	1982
CNRS-ISPE-NBER Conference on the Taxation of Capital	
"Welfare Effects of Investment Under Imperfect Competition"	1982
Internationales Institut für Management und Verwaltung Regulation Conference	
"Welfare, Regulatory Boundaries, and the Sustainability of Oligopolies"	1981
NBER-Kellogg Graduate School of Management Conference on the	
Econometrics of Market Models with Imperfect Competition	
"Discussion of Measurement of Monopoly Behavior: An	
Application to the Cigarette Industry"	1981
The Peterkin Lecture at Rice University	
"Deregulation: Ideology or Logic?"	1981
FTC Seminar on Antitrust Analysis	
"Viewpoints on Horizontal Mergers"	1982
"Predation as a Tactical Inducement for Exit"	1980
NBER Conference on Industrial Organization and Public Policy	
"An Economic Definition of Predation"	1980
The Center for Advanced Studies in Managerial Economics Conference on The Economics of	
Telecommunication	
"Pricing Local Service as an Input"	1980
Aspen Institute Conference on the Future of the Postal Service	
"Welfare Economics of Postal Pricing"	1979
Department of Justice Antitrust Seminar	
"The Industry Performance Gradient Index"	1979
Eastern Economic Association Convention	
"The Social Performance of Deregulated Markets for Telecom Services"	
1979	
Industry Workshop Association Convention	
"Customer Equity and Local Measured Service"	1979
Symposium on Ratemaking Problems of Regulated Industries	
"Pricing Decisions and the Regulatory Process"	1979

Woodrow Wilson School Alumni Conference "The Push for Deregulation"	1979
NBER Conference on Industrial Organization "Intertemporal Sustainability"	1979
World Congress of the Econometric Society "Theoretical Industrial Organization"	1980
Institute of Public Utilities Conference on Current Issues in Public Utilities Regulation "Network Access Pricing"	1978
ALI-ABA Conference on the Economics of Antitrust "Predatoriness and Discriminatory Pricing"	1978
AEI Conference on Postal Service Issues "What Can Markets Control?"	1978
University of Virginia Conference on the Economics of Regulation "Public Interest Pricing"	1978
DRI Utility Conference "Marginal Cost Pricing in the Utility Industry: Impact and Analysis"	1978
International Meeting of the Institute of Management Sciences "The Envelope Theorem"	1977
University of Warwick Workshop on Oligopoly "Industry Performance Gradient Indexes"	1977
North American Econometric Society Convention "Intertemporal Sustainability"	1979
"Social Welfare Dominance"	1978
"Economies of Scope, DAIC, and Markets with Joint Production"	1977
Telecommunications Policy Research Conference "Transition to Competitive Markets"	1986
"InterLATA Capacity Growth, Capped NTS Charges and Long Distance Competition"	1985
"Market Power in The Telecommunications Industry"	1984
"FCC Policy on Local Access Pricing"	1983
"Do We Need a Regulatory Safety Net in Telecommunications?"	1982
"Anticompetitive Vertical Conduct"	1981
"Electronic Mail and Postal Pricing"	1980
"Monopoly, Competition and Efficiency": Chairman	1979

"A Common Carrier Research Agenda"	1978
"Empirical Views of Ramsey Optimal Telephone Pricing"	1977
"Recent Research on Regulated Market Structure"	1976
"Some General Equilibrium Views of Optimal Pricing"	1975
National Bureau of Economic Research Conference on Theoretical Industrial Organization	
"Compensating Variation as a Measure of Welfare Change"	1976
Conference on Pricing in Regulated Industries: Theory & Application	
"Ramsey Optimal Pricing of Long Distance Telephone Services"	1977
NBER Conference on Public Regulation	
"Income Distributional Concerns in Regulatory Policy-Making"	1977
Allied Social Science Associations National Convention	
"Merger Guidelines and Economic Theory"	1990
Discussion of "Competitive Rules for Joint Ventures"	1989
"New Schools in Industrial Organization"	1988
"Industry Economic Analysis in the Legal Arena"	1987
"Transportation Deregulation"	1984
Discussion of "Pricing and Costing of Telecommunications Services"	1983
Discussion of "An Exact Welfare Measure"	1982
"Optimal Deregulation of Telephone Services"	1982
"Sector Differentiated Capital Taxes"	1981
"Economies of Scope"	1980
"Social Welfare Dominance"	1980
"The Economic Definition of Predation"	1979
Discussion of "Lifeline Rates, Succor or Snare?"	1979
"Multiproduct Technology and Market Structure"	1978
"The Economic Gradient Method"	1978
"Methods for Public Interest Pricing"	1977
Discussion of "The Welfare Implications of New Financial Instruments"	1976
"Welfare Theory of Concentration Indices"	1976
Discussion of "Developments in Monopolistic Competition Theory"	1976
"Hedonic Price Adjustments"	1975
"Public Good Attributes of Information and its Optimal Pricing"	1975
"Risk Invariance and Ordinally Additive Utility Functions"	1974
"Consumer's Surplus: A Rigorous Cookbook"	1974
University of Chicago Symposium on the Economics of Regulated Public Utilities	
"Optimal Prices for Public Purposes"	1976
American Society for Information Science	
"The Social Value of Information: An Economist's View"	1975
Institute for Mathematical Studies in the Social Sciences Summer Seminar	

"The Sustainability of Natural Monopoly"	1975
U.S.-U.S.S.R. Symposium on Estimating Costs and Benefits of Information Services "The Evaluation of the Economic Benefits of Productive Information"	1975
NYU-Columbia Symposium on Regulated Industries "Ramsey Optimal Public Utility Pricing"	1975

Research Seminars:

Bell Communications Research (2)	University of California, San Diego
Bell Laboratories (numerous)	University of Chicago
Department of Justice (3)	University of Delaware
Electric Power Research Institute	University of Florida
Federal Reserve Board	University of Illinois
Federal Trade Commission (4)	University of Iowa (2)
Mathematica	Universite Laval
Rand	University of Maryland
World Bank (3)	University of Michigan
Carleton University	University of Minnesota
Carnegie-Mellon University	University of Oslo
Columbia University (4)	University of Pennsylvania (3)
Cornell University (2)	University of Toronto
Georgetown University	University of Virginia
Harvard University (2)	University of Wisconsin
Hebrew University	University of Wyoming
Johns Hopkins University (2)	Vanderbilt University
M. I. T. (4)	Yale University (2)
New York University (4)	Princeton University (many)
Northwestern University (2)	Rice University
Norwegian School of Economics and Business Administration	Stanford University (5) S.U.N.Y. Albany

**Attachment 2: Expert Testimony Provided by Robert D. Willig in the Last Four
Years
September 2013**

1. In the matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless Including Commercial Mobile Services; Before the Federal Communications Commission; WT Docket No. 09-66; declaration, 9/30/09.
2. Cindy Cullen, Wendy Fleishman, on Behalf of Themselves and All Others Similarly Situated v. Albany Medical Center, Ellis Hospital, Northeast Health, Seton Health System, and St. Peter's Health Care Service, In the United States District Court for the Northern District of New York, Civil Action No. 06-CV-0765/ TJM/ DRH; expert report 2/29/2008; deposition 3/27-28/2008; expert report 9/4/2009; deposition 11/19-20/2009, declaration 12/28/2009.
3. In the Australian Competition Tribunal: Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 23 May 2006 under Section 44H(9) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Mount Newman Railway Line, By: Fortescue Metals Group Limited; Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 27 October 2008 under Section 44H(1) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Robe Railway By: Robe River Mining Co PTY LTD & ORS; Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 27 October 2008 under Section 44H(1) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Hamersley Rail Network, By: Hamersley Iron Co PTY LTD & ORS; Re: Application for Review of the Deemed Decision by the Commonwealth Treasurer of 27 October 2008 under Section 44H(1) of the Trade Practices Act 1974 (CTH) in Relation to the Application for Declaration of Services Provided by the Goldsworthy Railway, By: BHP Billiton Iron Ore PTY LTD and BHP Billiton Minerals PTY LTD; expert report 6/30/2009 and 9/18/2009, trial testimony 11/2/2009-11/6/2009.
4. Stagecoach Group PLC and Coach USA, Inc., et al, Acquisition of Control, Twin America, LLC, Before the Surface Transportation Board, Verified Statement of Professor Robert D. Willig, Submitted November 17, 2009.
5. In re: Rail Freight Fuel Surcharge Antitrust Litigation, In the United States District Court for the District of Columbia, MDL Docket No. 1869, Misc. No. 07-489 (PLF), expert report 8/1/2010, deposition 8/4/2010.
6. Before the Federal Reserve Bank: Docket Number R-1404: Proposed Rule on Debit Card Interchange Fees and Routing, written statement 2/22/2011.

7. Before the Surface Transportation Board: Docket Number EP 704: Review of Commodity, Boxcar, and TOFC/COFC Exemptions; written statement 1/31/2011; testimony at hearing 2/23, 24/2011.
8. New Zealand Commerce Commission vs. Malaysian Airline Systems Berhad, Ltd. and et. al.; High Court of New Zealand: CV 2008-404-8350, Brief of Evidence 4/28/2011, trial testimony 5/20/11 and 5/23-27/2011.
9. Before the Federal Communications Commission: Docket Number 11-65: For Consent to Assign or Transfer Control Licenses and Authorization, written reply statement 6/9/2011.
10. In Re: Checking Account Overdraft Litigation, MDL No. 2036 In the United States District Court for the Southern District of Florida, Miami Division, Case No. 09-MD-02036-JLK, Luquetta v. JPMorgan Chase Bank, Declaration In Support of JP Morgan Chase Bank, N.A.'s Opposition to Class Certification, June 16, 2011.
11. Before the Surface Transportation Board: Docket Number EP 705: Competition in the Rail Industry, written statement 4/12/2011, written reply statement 5/27/2011, testimony at hearing 6/22, 23/2011.
12. In the Matter of Rambus Inc. v. Micron Technology, Inc., et al. In the Superior Court of the State of California County of San Francisco, Civil Action No. 04-431105; expert report 11/08/2008; supplemental expert report 12/19/2008, deposition testimony 5/7/2009-5/8/2009, trial testimony 9/1,6,7/2011.
13. In Re McKesson Governmental Entities Average Wholesale Price Litigation, Master File No.: 1:08-CV-10843-PBS; The Board of County Commissioners of Douglas County, Kansas et al. v. McKesson Corp., expert report, April 14, 2010, Response Report, June 28, 2010; Related to Connecticut v. McKesson Corp., expert report, April 14, 2010; Related to Montana v. McKesson Corporation, expert report, November 8, 2010; Related to Oklahoma v. McKesson Corporation, expert report, November 8, 2010; San Francisco Health Plan, et al. v. McKesson Corporation, rebuttal expert report, 9/19/2011.
14. Before the Public Service Commission of Maryland, Case No.: 9271, In the Matter of the Merger of Exelon Corp. and Constellation Energy Group, Inc., written market power rebuttal testimony, 10/17/2011, written surrebuttal testimony 10/26/2011, hearing testimony, 11/2011.
15. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, DELL Inc., *et al.*, v. SHARP Corporation, *et al.*, Case No. 3:10-cv-01064 SI MDL No. 3:07-md-1827-SI, expert report 2/23/2012, deposition 4/18/2012.

16. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, Motorola Mobility Inc. v. SHARP Corporation, *et al.*, Case No. 3:09-cv-05840SI MDL No. 3:07-md-1827-SI, expert report 2/23/2012, deposition 4/18/2012.
17. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, AT&T Mobility Inc. v. SHARP Corporation, *et al.*, Case No. 09-cv-4997 SI MDL No. 07-m-1827-SI, expert report 2/27/2012, deposition 4/18/2012.
18. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, BEST BUY CO., Inc., *et. al.*, v. AU OPTRONICS CORP., *et al.*, Case No. 10-cv-4572 SI MDL No. 07-md-1827-SI, expert report 3/5/2012, deposition 4/18/2012.
19. Clark R. Huffman and Brandi K. Winters, individually and on behalf of all others similarly situated vs. PRUDENTIAL INSURANCE COMPANY of AMERICA, In the United States District Court for the Eastern District of Pennsylvania, Civ. No. 2:10-cv-05135-EL, declaration 4/10/2012.
20. In re Prudential Insurance Company of America SGLI/VGLI Contract Litigation, CLASS ACTION, Master Case No. 3:11-md-02208-MAP, In the United States District Court for the District of Massachusetts, declaration 5/10/2012.
21. Australian Competition and Consumer Commission v. Singapore Airlines Cargo PTE LTD *et. al.*, Before the Federal Court of Australia, District Registry: New South Wales, Division: General, No. NSD 1980 of 2008, NSD 363 of 2009, NSD 876 of 2009 and NSD 1213 of 2009, affidavit and expert report 7/12/2012.
22. Bandspeed, Inc. v. Sony Electronics, Inc. *et al.* and Cambridge Silicon Radio Limited, Cause No. A-11-CV-771-LY, In the United States District Court for the Western District of Texas, Austin Division, expert report, 9/21/2012.
23. M&G Polymers USA, LLC v. CSX Transportation, Inc., Before the Surface Transportation Board, Docket Number NOR 42123, verified statement, 11/27/2012.
24. National Collegiate Athletic Association *et al.*, Plaintiffs, v. Christopher J. Christie *et al.*, Defendants, In the United States District Court for the District of New Jersey, Civil Action No. 3:12-cv-04947 (MAS) (LHG), expert report 11/21/2012, deposition 11/30/2012.
25. In Re Cathode Ray Tube (CRT) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, Master

File No. CV-07-5944-SC MDL No. 1917, expert report 12/17/12, deposition 01/24/12.

26. In Re Titanium Dioxide Antitrust Litigation, In the United States District Court of Maryland Northern Division, Case No. 1:10-cv-00318-RDB, expert report 12/21/2012, deposition testimony 02/07/2013, 02/08/2013.
27. PPL EnergyPlus, LLC, et al., v. Douglas R.M. Nazarian, in his official capacity as Chairman of the Maryland Public Service Commission, et al., In the United States District Court of Maryland Northern Division, Case No. 1:12-cv-01286-MJG, expert report 12/21/2012, supplemental expert report 02/01/2013, deposition testimony 02/14/2013, trial testimony 03/08/2013.
28. PPL EnergyPlus, LLC, et al., v. Robert Hanna (originally, Lee A. Solomon), in his official capacity as President of the New Jersey Board of Public Utilities, et al., In the United States District Court for the District of New Jersey, Case No. 3:11-cv-00745-PGS-DEA, expert report 02/06/2013, deposition 02/14/2013 and 02/21/2013, and trial testimony 4/9-10/2013.
29. Total Petrochemicals & Refining USA, Inc. v. CSX Transportation, Inc., Before the Surface Transportation Board, Docket Number NOR 42121, verified statement, 06/20/2013.
30. Bandspeed Inc v. Garmin International, Inc. et al., In the United States District Court for the Western District of Texas, Austin Division, Cause No. A-11-CV-771-LY, expert report, 08/01/2013.

Highly Confidential

Attachment 3: List of Materials Relied Upon Expert Report of Robert D. Willig Relating to Direct Purchaser Class Action <i>In re Cathode Ray Tube Antitrust Litigation</i>		
	<i>Bates Stamp/Title</i>	<i>Date</i>
<u>Depositions and Exhibits</u>		
30(b)(6) de Moor, Roger (PENAC)		31-Jul-12
30(b)(6) de Moor, Roger (PENAC)		1-Aug-12
30(b)(6) Heinecke, Jay (TAEC)		31-Jul-12
30(b)(6) Heiser, L. Thomas (HEDUS)		3-Jul-12
30(b)(6) Iwasawa, Toru (Hitachi)		11-Jul-12
30(b)(6) Kawashima, Yasuhiko (HDL)		18-Jul-12
30(b)(6) Kawashima, Yasuhiko (HDL)		19-Jul-12
30(b)(6) Kobayashi, Nobuhiko (HDL)		17-Jul-12
30(b)(6) Kurosawa, Koji (Toshiba)		30-Jul-12
30(b)(6) Lee, Jaein (SDI)		6-Jun-12
30(b)(6) Lee, Jaein (SDI)		7-Jun-12
30(b)(6) Nakano, Takashi (MTPD)		13-Jul-12
30(b)(6) Nishiyama, Hirokazu (Panasonic, MTPD)		17-Jul-12
30(b)(6) Nishiyama, Hirokazu (Panasonic, MTPD)		18-Jul-12
30(b)(6) Panosian, Steve (SEA)		17-Jul-12
Son, Michael (SDI)		5-Feb-13
Son, Michael (SDI)		6-Feb-13
30(b)(6) Tobinaga, Tatsuo (Panasonic, MTPD)		16-Jul-12
30(b)(6) Tobinaga, Tatsuo (Panasonic, MTPD)		17-Jul-12
30(b)(6) Uchiyama, Yoshiaki (TACP)		1-Aug-12
30(b)(6) Wolff, Edwin (PNA)		18-Jul-12
<u>Expert Materials</u>		
Expert Report of Robert D. Willig relating to Indirect Purchaser Plaintiffs		17-Dec-12
Rebuttal Declaration of Robert D. Willig		25-Mar-13
Expert Report of Jeffrey J. Leitzinger, Ph.D.		14-May-13
Corrected Expert Report of Jeffrey J. Leitzinger, Ph.D.		1-Aug-13
<u>Expert Depositions</u>		
Leitzinger, Jeffrey		22-Aug-13
<u>Legal</u>		
Direct Purchaser Plaintiffs' Consolidated Amended Complaint		16-Mar-09
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Fuji Chimera Research Institute, <i>Flat Panel Display Applications: Trends and Forecasts</i> , 2001		
Fuji Chimera Research Institute, <i>Flat Panel Display Applications: Trends and Forecasts</i> , 2007		
<u>Public Documents</u>		

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Attachment 3: List of Materials Relied Upon
Expert Report of Robert D. Willig Relating to Direct Purchaser Class Action
In re Cathode Ray Tube Antitrust Litigation

<i>Bates Stamp/Title</i>	<i>Date</i>
International Labour Organization, <i>Consumer Price Index Manual: Theory and Practice</i> , 2004	
United States International Trade Commission, <i>Color Picture Tubes from Canada, Japan, Korea, and Singapore</i> , Investigations Nos. 731-TA-367-370 (Review), Determinations and Views of the Commission, USITC Publication No 3291, 2000	

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CHU00028385-386
CHU00028599-600
CHU00028638.01E-.02E
CHU00028674
CHU00028707-710
CHU00028713-714
CHU00028763.01E
CHU00028763-767
CHU00028952-954
CHU00029138-143
CHU00029171-174
CHU00029262-264
CHU00030020-025
CHU00030071-078
CHU00030670-674
CHU00030809-814
CHU00031113-114
CHU00031142-147
CHU00031249-252
CHU00036392-393
CHU00036394-395
CHU00154658-694
MTPD-0300203-250
PHLP-CRT-049353
SDCRT-0021278-294
SDCRT-0086662-664
TAEC00006084-100
TAEC00006176-208

Data**Chunghwa**

ADDR1.txt
ADDR2.txt
ADDR3.txt
CHWA00000002 (CPTM Transactional Records)_CDT 1994-2006.txt
CHWA00000002 (CPTM Transactional Records)_CPT 1994_1999.txt
CHWA00000002 (CPTM Transactional Records)_CPT 2000_2006.txt
CHWA00000004 (CPTM Customer Records).txt
CHWA00000005 (CPTF Transactional Records)_1997_2002.txt
CHWA00000005 (CPTF Transactional Records)_2003_2005.txt
CHWA00000005 (CPTF Transactional Records)_2006.txt
CHWA00000007 (CPTF Customer Records).txt
CHWA00000009 (CPTT Transactional Records 1994-1998)_1994.txt
CHWA00000009 (CPTT Transactional Records 1994-1998)_1995.txt
CHWA00000009 (CPTT Transactional Records 1994-1998)_1996.txt
CHWA00000009 (CPTT Transactional Records 1994-1998)_1997.txt
CHWA00000009 (CPTT Transactional Records 1994-1998)_1998.txt
CHWA00000011 (CPTT Transactional Records 1999-2003)_1999.txt
CHWA00000011 (CPTT Transactional Records 1999-2003)_2000.txt
CHWA00000011 (CPTT Transactional Records 1999-2003)_2001.txt
CHWA00000011 (CPTT Transactional Records 1999-2003)_2002.txt
CHWA00000011 (CPTT Transactional Records 1999-2003)_2003.txt
CHWA00000012 (CPTT Customer Records 1994-1998).txt
CHWA00000014 (CPTT Customer Records 1999-2003).txt
CURNM1.txt
PINC.txt

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Attachment 3: List of Materials Relied Upon
Expert Report of Robert D. Willig Relating to Direct Purchaser Class Action
In re Cathode Ray Tube Antitrust Litigation

Bates Stamp/Title

Date

Hitachi

abbr_of_del_dest.txt
 abbr_of_order.txt
 customer_in_english.txt
 eu.txt
 Foreign16.txt
 Foreign17.txt
 Foreign18.txt
 Foreign19.txt
 Foreign28.txt
 Foreign5.txt
 Foreign55.txt
 Foreign56.txt
 Foreign57.txt
 Foreign58.txt
 Foreign59.txt
 Foreign7.txt
 HAL_CRT00000051_02_Aug_December.txt
 HAL_CRT00000051_03.txt
 HAL_CRT00000051_04.txt
 HAL_CRT00000051_05.txt
 HAL-CRT00001771.txt
 HDP_CRT00018516_T.txt
 HDP_CRT00018516_T2.txt
 HEDUS-CRT00179555.txt

LGE

LGE00057028.txt
 LGE00057277.txt
 LGE00057335.txt
 LGE00057547.txt
 LGE00057554.txt
 LGE00057582.txt
 LGE00057608.txt
 LGE00057776.txt
 LGEUSA_MN_1997.txt
 LGEUSA_MN_1998.txt
 LGEUSA_MN_1999.txt
 LGEUSA_MN_2000.txt
 LGEUSA_MN_2001.txt
 LGEUSA_MN_2002.txt
 LGEUSA_MN_2003.txt
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 LGEUSA_TV_2002.txt
 LGEUSA_TV_2003.txt
 LGEUSA_TV_2004.txt
 LGEUSA_TV_2005.txt
 LGEUSA_TV_2006.txt
 LGEUSA_TV_2007.txt
 ZENCRT44_HC_a.txt
 ZENCRT44_HC_b.txt
 ZENCRT44_HC_c.txt
 ZENCRT44_HC_d.txt
 ZENCRT44_HC_e.txt
 ZENCRT44_HC_f.txt
 ZENCRT44_HC_g.txt
 ZENCRT44_HC_h.txt

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Attachment 3: List of Materials Relied Upon
Expert Report of Robert D. Willig Relating to Direct Purchaser Class Action
In re Cathode Ray Tube Antitrust Litigation

Bates Stamp/Title

Date

ZENCRT44_HC_i.txt
 ZENCRT45_HC.txt
 ZENCRT46_HC_a.txt
 ZENCRT46_HC_b.txt
 ZENCRT46_HC_c.txt

LPD

Billing_00Apr.txt
 Billing_00Aug.txt
 Billing_00Dec.txt
 Billing_00Feb.txt
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 Billing_00Jul.txt
 Billing_00Jun.txt
 Billing_00Mar.txt
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 Billing_01Mar.txt
 Billing_01May.txt
 Billing_01Nov.txt
 Billing_01Oct.txt
 Billing_01Sep.txt

Exhibit 1: Regressions of Changes in Actual Price on Changes in Target Price

Row	Dependent Variable	Independent Variables			Merchant Sales Only?	Transfer Sales Only?	Results				Robustness Checks		
	Change in Actual Price (Level of Aggregation)	Change in Alleged Target Price (Level of Aggregation)	Change in Macroeconomic Variables	Change in Negotiated Price Currency-to-USD Exchange Rate Variables			Number of Observations	Estimated Coefficient on Change in:		R-Squared	Range of Estimated Coefficients on Change in:		R-Squared Range
								Target Price	Lagged Target Price		Target Price	Lagged Target Price	
1	Model, Customer, Quarter	Manufacturer, Application, Size, Finish, Quarter					5,315	0.157***	-	0.033	0.136*** - 0.197***	-	0.012 - 0.050
2	Model, Customer, Quarter	Manufacturer, Application, Size, Finish, Quarter			X		5,019	0.168***	-	0.036	0.147*** - 0.206***	-	0.013 - 0.054
3	Model, Customer, Quarter	Manufacturer, Application, Size, Finish, Quarter				X	296	0.036	-	0.003	-0.001 - 0.036	-	0.000 - 0.003
4	Model, Customer, Quarter	Manufacturer, Application, Size, Finish, Quarter	X				3,615	0.139***	-	0.065	0.111*** - 0.177***	-	0.025 - 0.081
5	Model, Customer, Currency, Quarter	Manufacturer, Application, Size, Finish, Quarter		X			5,318	0.144***	-	0.111	0.126*** - 0.198***	-	0.042- 0.158
6	Model, Customer, Quarter	Manufacturer, Application, Size, Finish, Quarter					3,615	0.160***	0.096***	0.043	0.107*** - 0.200***	0.096*** - 0.110***	0.017 - 0.064

Sources:

- (1) Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LG, LPD, SDI, and Toshiba;
- (2) Leitzinger Report backup: "Target Prices_part1.csv," "Target Prices_part2.csv," and "Target Prices_part3.csv;"
- (3) DisplaySearch Data; Bureau of Labor Statistics; OECD StatExtracts Database.

Exhibit 1: Notes for Regressions of Changes in Actual Price on Changes in Target Price

Notes:

- (1) An actual price observation represents the sales-quantity-weighted average actual prices for a given model, customer, and quarter (rows 1-4 and row 6) or for a given model, customer, the currency in which the prices were negotiated ("negotiated currency"), and quarter (row 5) using global CRT sales data for Q1 1995 to Q4 2007;
- (2) A target price observation represents the simple average of the target prices identified by Dr. Leitzinger for a given manufacturer, application (CDT/CPT), size, finish (bare/ITC), and quarter;
- (3) Actual and target price changes represent the average quarterly percentage change (divided by 100) in the actual price for a given model and customer (and negotiated currency in row 5) and the average quarterly percentage change (divided by a hundred) in the target price for the corresponding manufacturer, application, size, and finish between quarters t and $t-x$, where x is defined as the smallest positive integer (possibly equal to 1) for which there were actual prices for the model-customer (and currency in row 5) and target prices for the panel in quarters t and $t-x$. That is, the actual and target prices changes were calculated over the same period of time, and x represents the shortest period over which this was possible;
- (4) Prices were excluded as outliers as follows: For each quarter in which a given CRT model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (5) The following observations were also excluded: (a) observations for which the model number, customer name, size, or finish (or currency for the model presented in row 5) were missing; (b) sales between integrated entities that sold CRTs; (c) observations with more than four quarters between observed pairs of actual price changes and target price changes; and (d) observations identified by Dr. Leitzinger as outliers;

** Notes continued on next page.*

Exhibit 1: Notes (Continued) for Regressions of Changes in Actual Price on Changes in Target Price

Notes:

(6) The macroeconomic variables included in the model presented in row 4 are: (a) the unemployment rate and total industrial production for the G7 countries (the United States, the United Kingdom, Germany, France, Italy, Japan, and Canada); (b) the BLS producer price index for machine-made pressed and blown lighting, automotive, and electronic glassware; and (c) total quarterly LCD shipments by application beginning in 1999. They are the same macroeconomic variables included in the model presented in Figure 7 of the Leitzinger Report. The change in each macroeconomic variable represents the average quarterly percentage change (divided by a hundred) in that variable between quarters t and $t-x$, where t and x are defined according to Note #3 above (the only exception is the change in the G7 unemployment rate, which represents the average quarterly percentage point change in that variable between quarters t and $t-x$);

(7) The exchange rate used in row 5 represents the ratio for quarter t between the average price in the negotiated currency and the U.S. dollar average price (both weighted by sales volume) for a given model, customer, and negotiated currency. The change in the exchange rate represents the percentage change (divided by a hundred) in the exchange rate between quarters t and $t-x$, where t and x are defined according to Note #3 above. The model presented in row 5 includes the change in the exchange rate and interactions between this variable and a series of eight "dummy" variables that take the value 1 if the currency in which the actual price was negotiated is the Deutsche Mark, Euro, Japanese Yen, South Korean Won, Malaysian Ringgit, Chinese Yuan, Taiwan New Dollar, or U.S. Dollar respectively, and zero otherwise. To avoid collinearity there is no dummy variable that equals 1 for prices negotiated in Brazil Real;

(8) I performed the following robustness checks on each of the regressions presented in the above table:

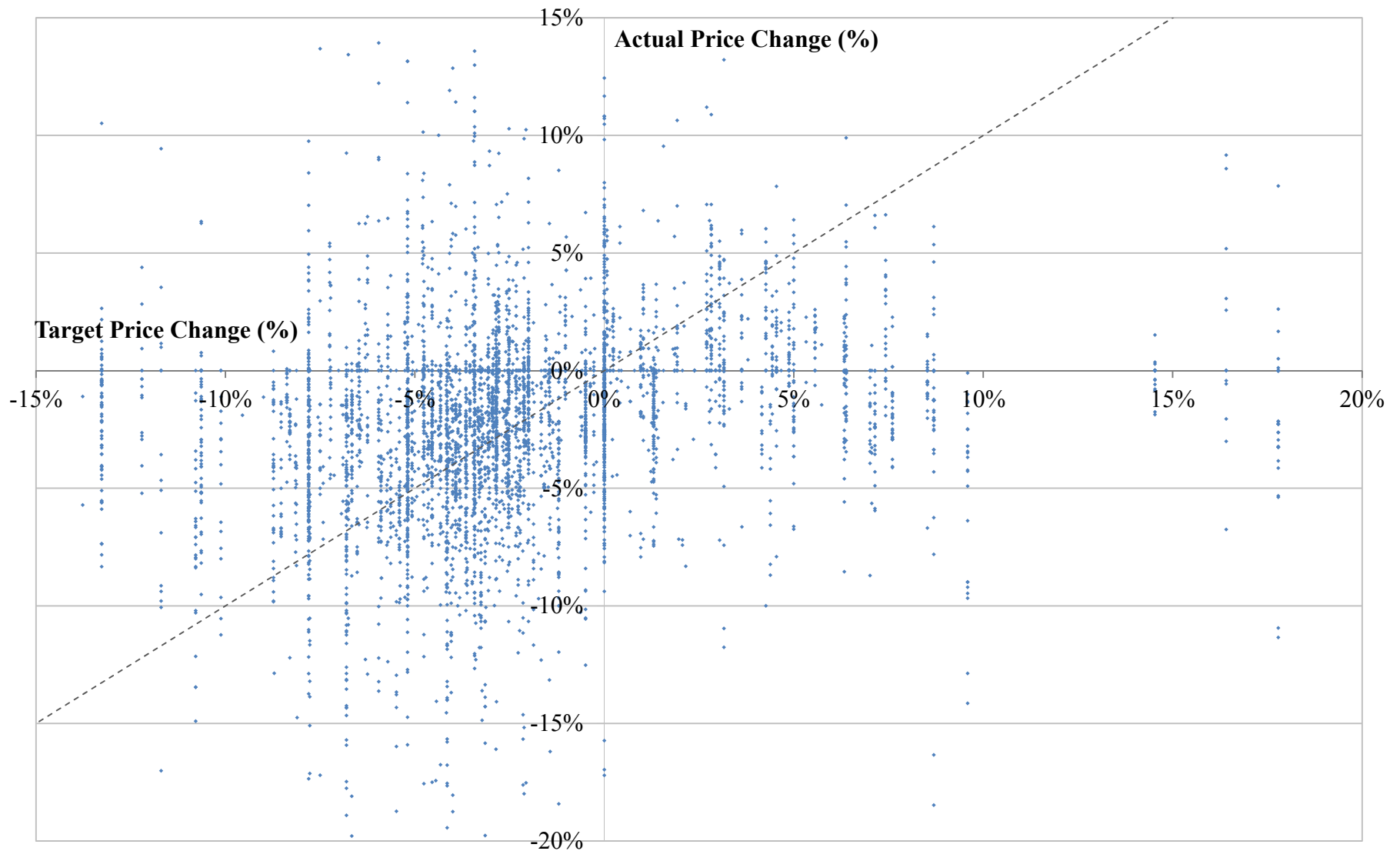
- weighting observations by sales volume;
- limiting the maximum period between pairs of actual and target price changes to one quarter;
- aggregating actual prices by "panel" (defined by Dr. Leitzinger as all sales to the same customer of models that share the same manufacturer, application, size, and finish) and quarter (or by panel, currency, and quarter in the model presented in row 5);
- using clustered standard errors grouped by panel;

The range of results from these robustness checks are reported in the table;

(9) (***) indicates that the estimated coefficient is different from zero at the 0.1% significance level.

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**Exhibit 2: Actual Price Change vs. Target Price Change
by Model, Customer, and Quarter**



Sources: (1) Global tubes data for Chunghwa, Hitachi, MTPD, Panasonic, LG, LPD, SDI, and Toshiba for the class period; (2) Leitzinger Report backup: "Target Prices_part1.csv," "Target Prices_part2.csv," and "Target Prices_part3.csv."

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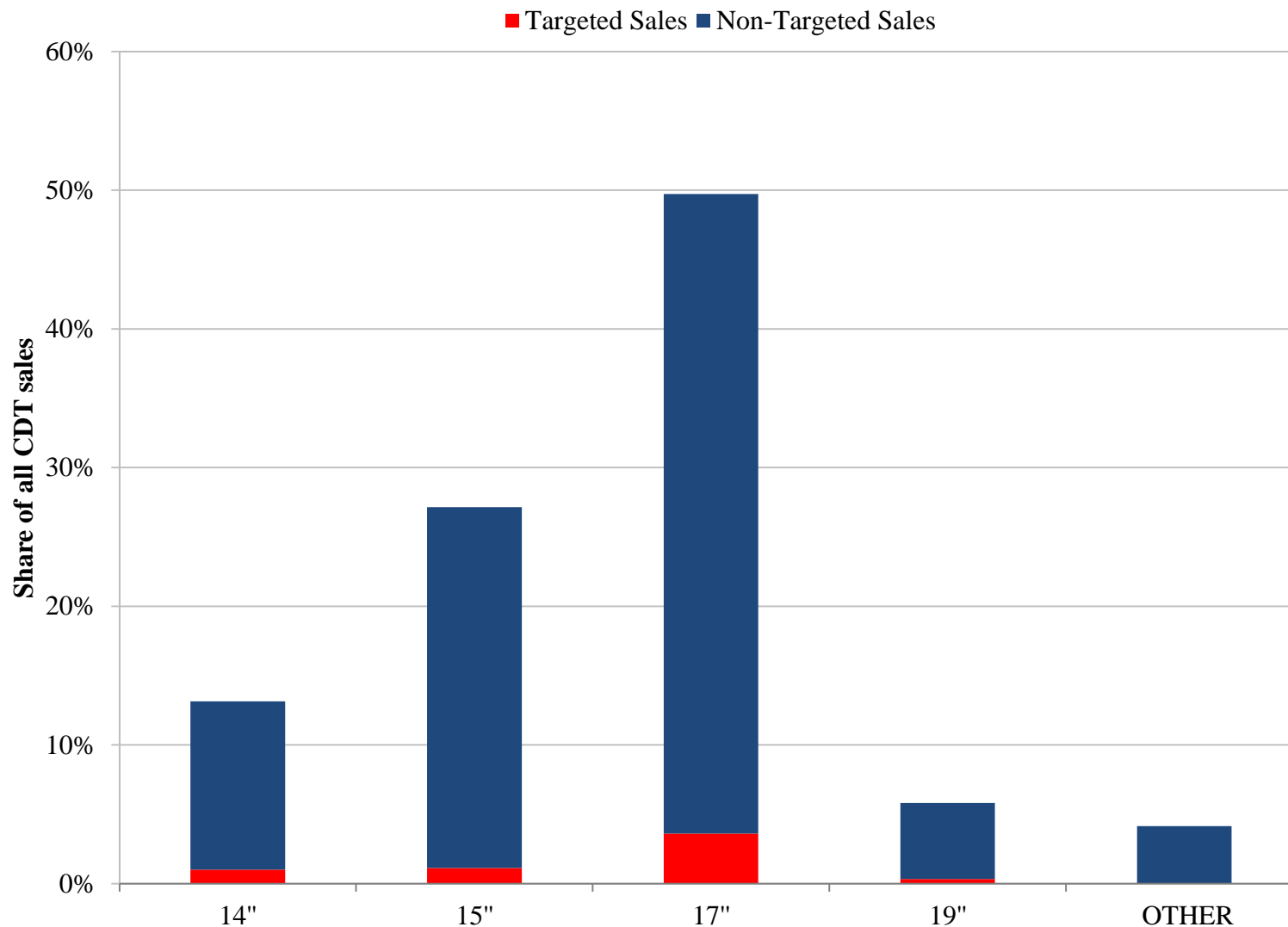
Exhibit 2: Notes for Actual Price Change vs. Target Price Change by Model, Customer, and Quarter

Notes:

- (1) An actual price observation represents the sales-quantity-weighted average actual prices for a given model, customer, and quarter using global CRT sales data for Q1 1995 to Q4 2007;
- (2) A target price observation represents the simple average of the target prices identified by Dr. Leitzinger for a given manufacturer, application (CDT/CPT), size, finish (bare/ITC) and quarter;
- (3) Actual and target price changes represent the average quarterly percentage change (divided by 100) in the actual price for a given model and customer and the average quarterly percentage change (divided by a hundred) in the target price for the corresponding manufacturer, application, size, and finish between quarters t and $t-x$, where x is defined as the smallest positive integer (possibly equal to 1) for which there were actual prices for the model-customer and target prices for the panel in quarters t and $t-x$. That is, the actual and target prices changes were calculated over the same period of time, and x represents the shortest period over which this was possible;
- (4) Prices were excluded as outliers as follows: For each quarter in which a given CRT model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as “very large price decreases” or “very large price increases,” respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (5) The following observations were also excluded: (a) observations for which the model number, customer name, size, or finish were missing; (b) sales between integrated entities that sold CRTs; (c) observations with more than four quarters between observed pairs of actual price changes and target price changes; and (d) observations identified by Dr. Leitzinger as outliers;
- (6) A *de minimis* number of observations are outside the bounds of the x or y axis.

Exhibit 3A: Shares of CDTs Sold: Targeted vs. Non-Targeted

(Based on Target Prices Identified by Dr. Leitzinger)

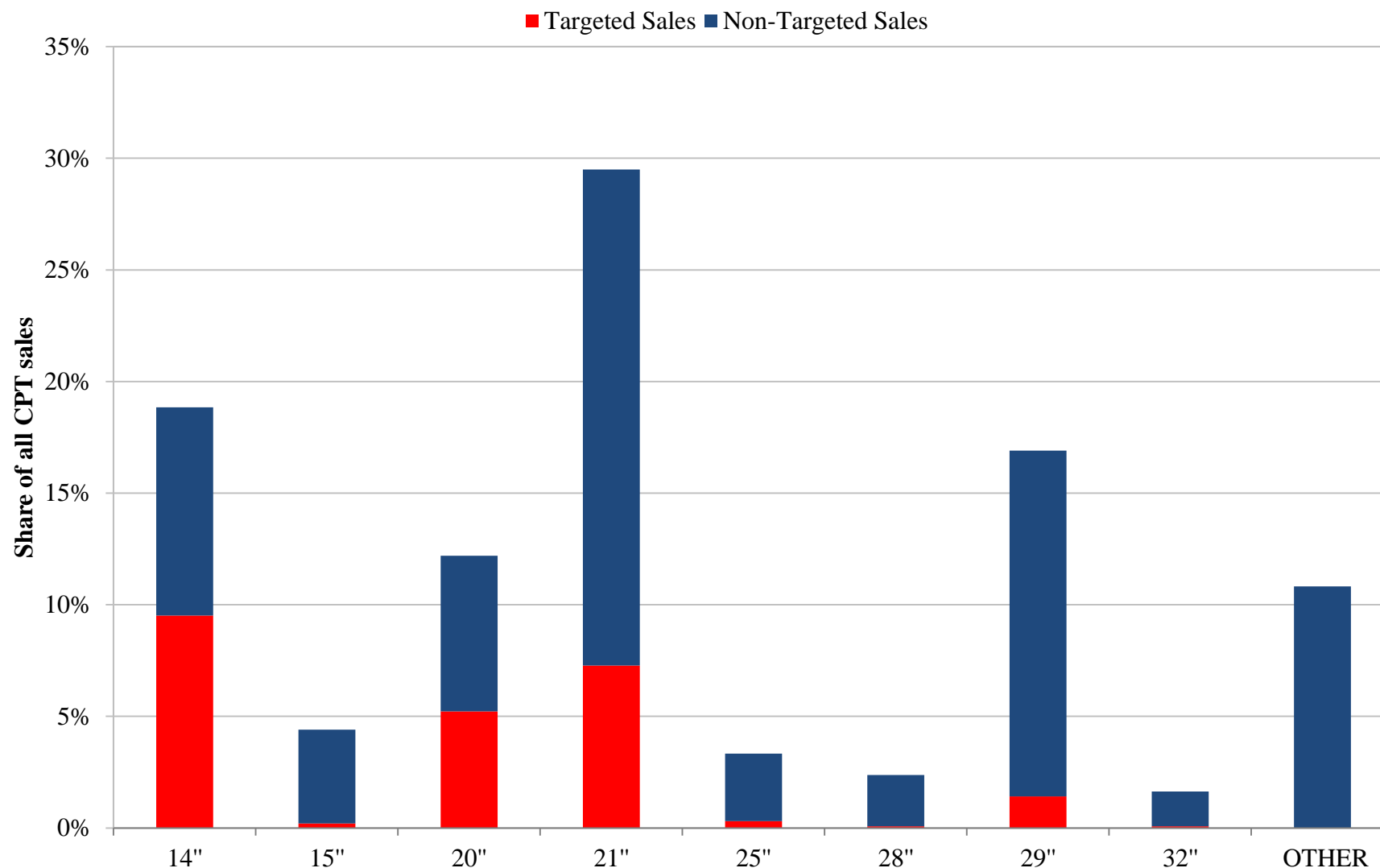


Sources: (1) Global tubes data for Chunghwa, Hitachi, MTPD, Panasonic, LG, LPD, SDI, and Toshiba; (2) Leitzinger Report backup: "Target Prices_part1.csv," "Target Prices_part2.csv," and "Target Prices_part3.csv."

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Exhibit 3B: Shares of CPTs Sold: Targeted vs. Non-Targeted

(Based on Target Prices Identified by Dr. Leitzinger)



Sources: (1) Global tubes data for Chunghwa, Hitachi, MTPD, Panasonic, LG, LPD, SDI, and Toshiba; (2) Leitzinger Report backup: "Target Prices_part1.csv," "Target Prices_part2.csv," and "Target Prices_part3.csv."

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Exhibit 3: Notes for Shares of CPT/CDTs Sold: Targeted vs. Non-Targeted

Notes:

- (1) CRT sales were classified as "targeted" if Dr. Leitzinger identified an alleged target price for the corresponding manufacturer, application (CDT/CPT), size, finish (bare/ITC), and quarter and "non-targeted" if he did not identify an alleged applicable target price.
- (2) The targeted share of CRT sales and non-targeted share of CRT sales were then calculated by application and size using global CRT sales data for March 1, 1995 to November 25, 2007;
- (3) Observations identified by Dr. Leitzinger as outliers were excluded;
- (4) For CDTs in Exhibit 3A and CPTs in Exhibit 3B, the "other" category represents all sizes of the respective application for which Dr. Leitzinger did not identify any target prices.

Exhibit 4: Target Prices Are Poor Predictors of Actual CRT Prices

Dependent Variable	Independent Variables	Outliers Excluded?	Level of Actual Price Aggregation	Observations (N)	Probability of Errors Greater than X% when Predicting Actual CRT Prices Based on Target Prices		
					X=5%	X=10%	X=15%
Actual Price	Target Price, Lagged Target Price	No	Panel, Quarter	3,151	71.8%	48.0%	30.1%
Actual Price	Target Price, Lagged Target Price	Yes	Model, Customer, Quarter	3,856	73.1%	50.2%	32.5%

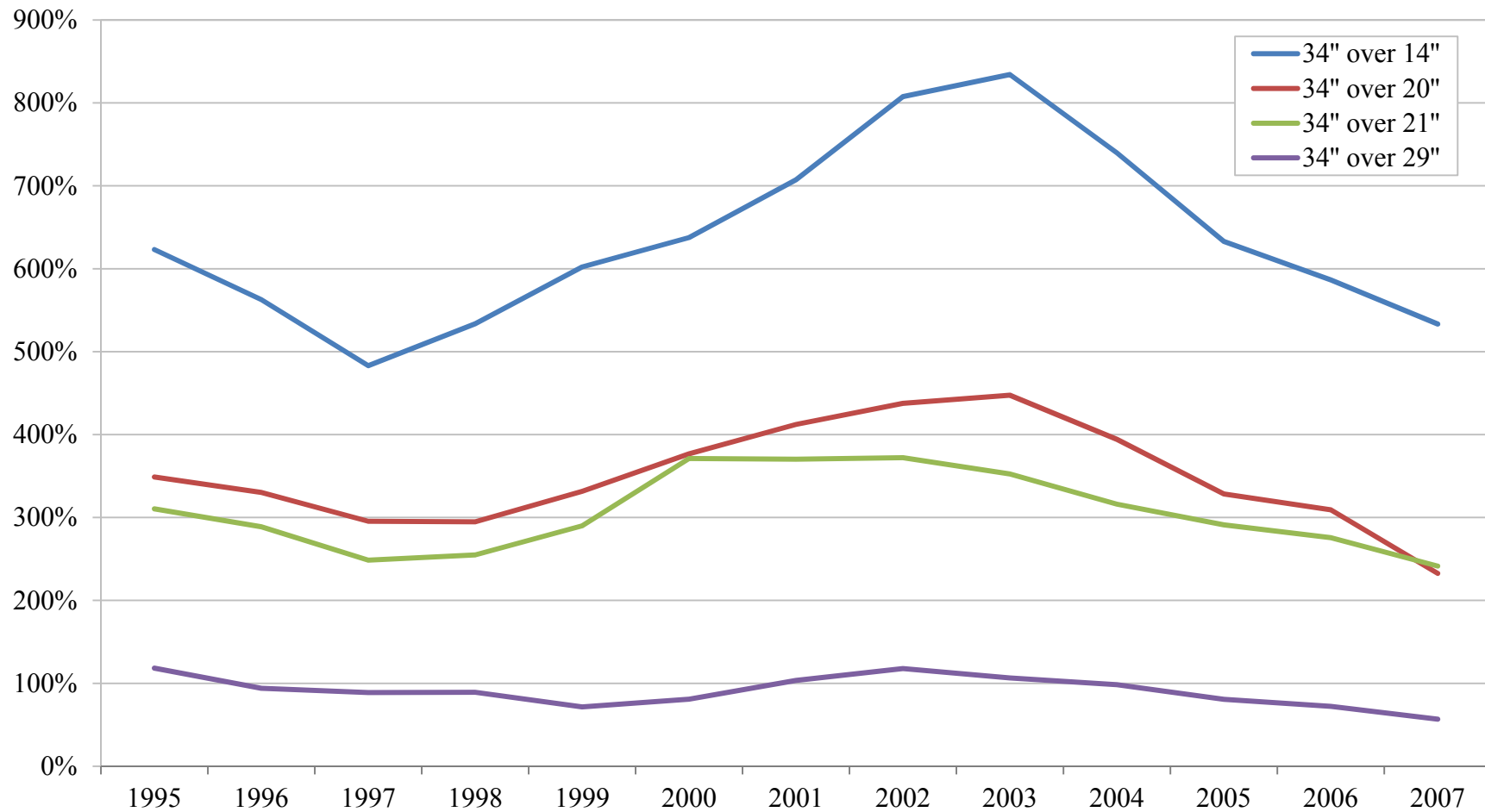
Sources: (1) Global tubes data for Chunghwa, Hitachi, MTPD, Panasonic, LG, LPD, SDI, and Toshiba for the class period; (2) Leitzinger Report backup: “Target Prices_part1.csv,” “Target Prices_part2.csv,” and “Target Prices_part3.csv.”

Exhibit 4: Notes for Target Prices Are Poor Predictors of Actual CRT Prices

Notes:

- (1) The model presented in row 1 is based on the same data that Dr. Leitzinger used in the model presented in Figure 7 of his report. Specifically, an actual price observation represents the sales-quantity-weighted average actual prices for a given manufacturer, application (CDT/CPT), size, finish (bare/ITC), customer, and quarter using global CRT sales data for Q1 1995 to Q4 2007, and a target price observation represents the simple average of the target prices identified by Dr. Leitzinger for the corresponding manufacturer, application (CDT/CPT), size, finish (bare/ITC) and quarter;
- (2) In the model presented in row 2, a target price observation is defined in the same manner as in the model presented in row 1, but an actual price observation represents the sales-quantity-weighted average actual prices for a given model, customer, and quarter using global CRT sales data for Q1 1995 to Q4 2007;
- (3) In the model presented in row 2, actual prices were excluded as outliers as follows: For each quarter in which a given CRT model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as “very large price decreases” or “very large price increases,” respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (4) The following observations were also excluded: (a) observations identified by Dr. Leitzinger as outliers; and (b) observations for which the model number, customer name, size, or finish were missing (from the model presented in row 1 only);
- (5) The reported probabilities that the predicted actual prices would be greater than X% are statistically significant at the 95% confidence level. Specifically, they are based on the 5% lower bound on the variance of the prediction errors.

Exhibit 5: CPT Size Price Premiums Implied by Dr. Leitzinger's Hedonic Regressions



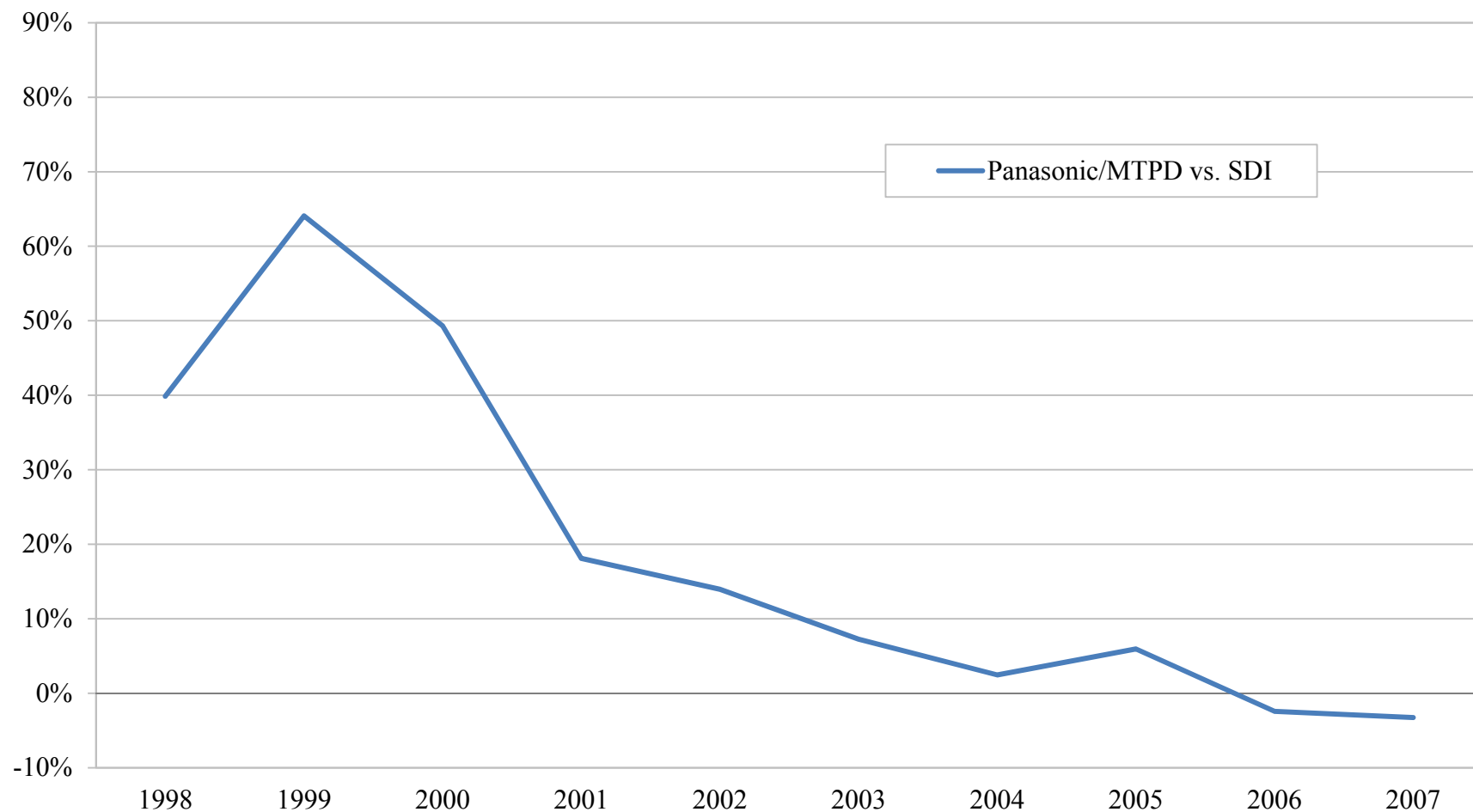
Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LG, SDI, and Toshiba.

Exhibit 5: Notes for CPT Size Price Premiums Implied by Dr. Leitzinger's Hedonic Regressions

Notes:

- (1) Size price premiums were calculated by estimating regressions identical to those reported in Figure 5 of the Leitzinger Report;
- (2) The analysis is based on identical data to those used by Dr. Leitzinger in the analysis presented in Figure 5 of his report;
- (3) The data cover the 1995-2007 time period;
- (4) An observation represents a specific CPT transaction or the total sales for a specific CPT model, customer, and month; this is the format in which the CPT sales data were produced;
- (5) The dependent variable in each regression is the natural log of the price, and the explanatory variables are: sales quantities and a dummy variable for each manufacturer, size, finish (bare/ITC), and aspect ratio (wide/standard screen);
- (6) The average size price premiums for each size pair and year were calculated using the following formula: (a) the size price premium for a given size pair and quarter was calculated as: $\text{exponential}(\text{the estimated coefficient on the size } X\text{-inch dummy} - 1)$, where $X = 14, 20, 21, \text{ or } 29$ inches; (b) the premiums for a given size pair were then averaged across the quarters in a given year;
- (7) The CPT sizes analyzed were the only sizes that accounted for at least 9% of all CPT sales over the analysis period;
- (8) A quarterly regression was only included in the calculation of the annual size premium if it satisfied the following two criteria: (a) the regression included at least 100 observations; (b) the regression included at least ten observations of considerable quantity (i.e., not in the bottom quartile of the quantity distribution in the overall data) for each of the CPT sizes being compared.

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Exhibit 6: CPT Manufacturer Price Premiums Implied by Dr. Leitzinger's Hedonic Regressions

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LG, SDI, and Toshiba.

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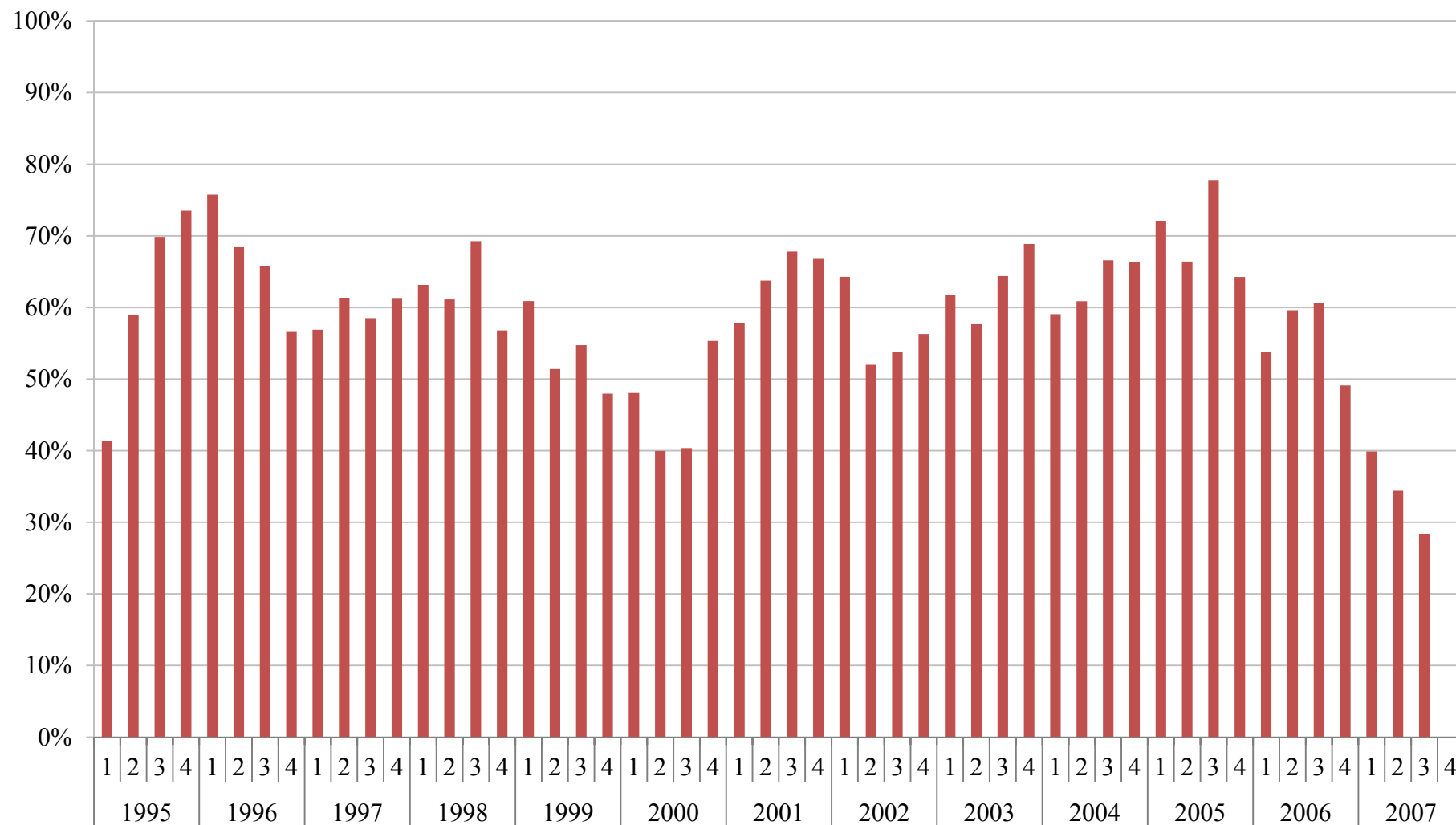
Exhibit 6: Notes for CPT Manufacturer Price Premiums Implied by Dr. Leitzinger's Hedonic Regressions

Notes:

- (1) Manufacturer price premiums were calculated by estimating regressions identical to those reported in Figure 5 of the Leitzinger Report;
- (2) The analysis is based on identical data to those used by Dr. Leitzinger in the analysis presented in Figure 5 of his report;
- (3) The data cover the 1995-2007 time period;
- (4) An observation represents a specific CPT transaction or the total sales for a specific CPT model customer, and month; this is the format in which the CPT sales data were produced;
- (5) The dependent variable in each regression is the natural log of the price, and the explanatory variables are: sales quantities and a dummy variable for each manufacturer, size, finish (bare/ITC), and aspect ratio (wide/standard screen);
- (6) The average manufacturer price premiums in each year were calculated using the following formula: (a) the quarterly premium was calculated as: exponential (the estimated coefficient on the Panasonic/MTPD dummy - the estimated coefficient on the SDI dummy) - 1; (b) the premiums were then averaged across the quarters in a given year;
- (7) A quarterly regression was only included in the calculation of the annual manufacturer price premium if it satisfied the following two criteria: (a) the regression included at least 100 observations; (b) the regression included at least ten observations of considerable quantity (i.e., not in the bottom quartile of the quantity distribution in the overall data) for Panasonic/MTPD and SDI.

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**Exhibit 7A: Share of Observations with a Gap of More than 5% Between Actual CDT
Prices and Prices Predicted by Dr. Leitzinger's Hedonic Regressions**



Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LG, SDI, and Toshiba.

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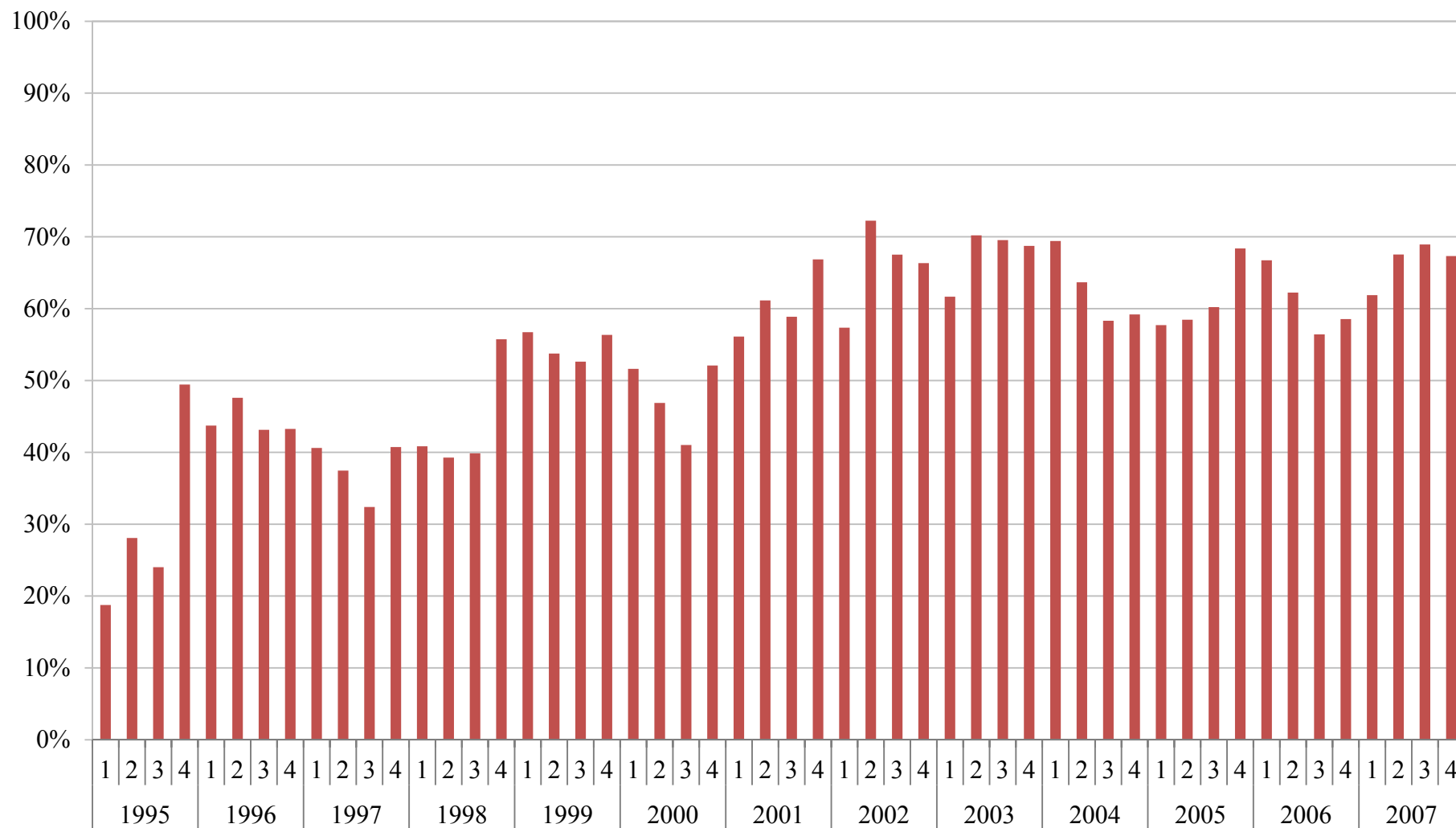
Exhibit 7A: Notes for Share of Observations with a Gap of More than 5% Between Actual CDT Prices and Prices Predicted by Dr. Leitzinger's Hedonic Regressions

Notes:

- (1) Gaps were calculated by estimating regressions identical to those reported in Figure 5 of the Leitzinger Report;
- (2) The analysis is based on identical data to those used by Dr. Leitzinger in the analysis presented in Figure 5 of his report;
- (3) The data cover the 1995-2007 time period;
- (4) An observation represents a specific CDT transaction or the total sales for a specific CDT model, customer, and month; this is the format in which the CDT sales data were produced;
- (5) The dependent variable in each regression is the natural log of the price, and the explanatory variables are: sales quantities and a dummy variable for each manufacturer, size, finish (bare/ITC), and aspect ratio (wide/standard screen);
- (6) Gaps were calculated using the following steps: (a) The predicted price was calculated for each observation based on the estimated regression equation; (b) The gap for each observation represents the absolute value of the percentage difference between the predicted price and the actual price; (c) For each quarter, the fraction of observations for which the gap was greater than 5% was calculated and plotted;
- (7) A quarterly regression was excluded if it did not include at least 100 observations.

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Exhibit 7B: Share of Observations with a Gap of More than 5% Between Actual CPT Prices and Prices Predicted by Dr. Leitzinger's Hedonic Regressions



Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LG, SDI, and Toshiba.

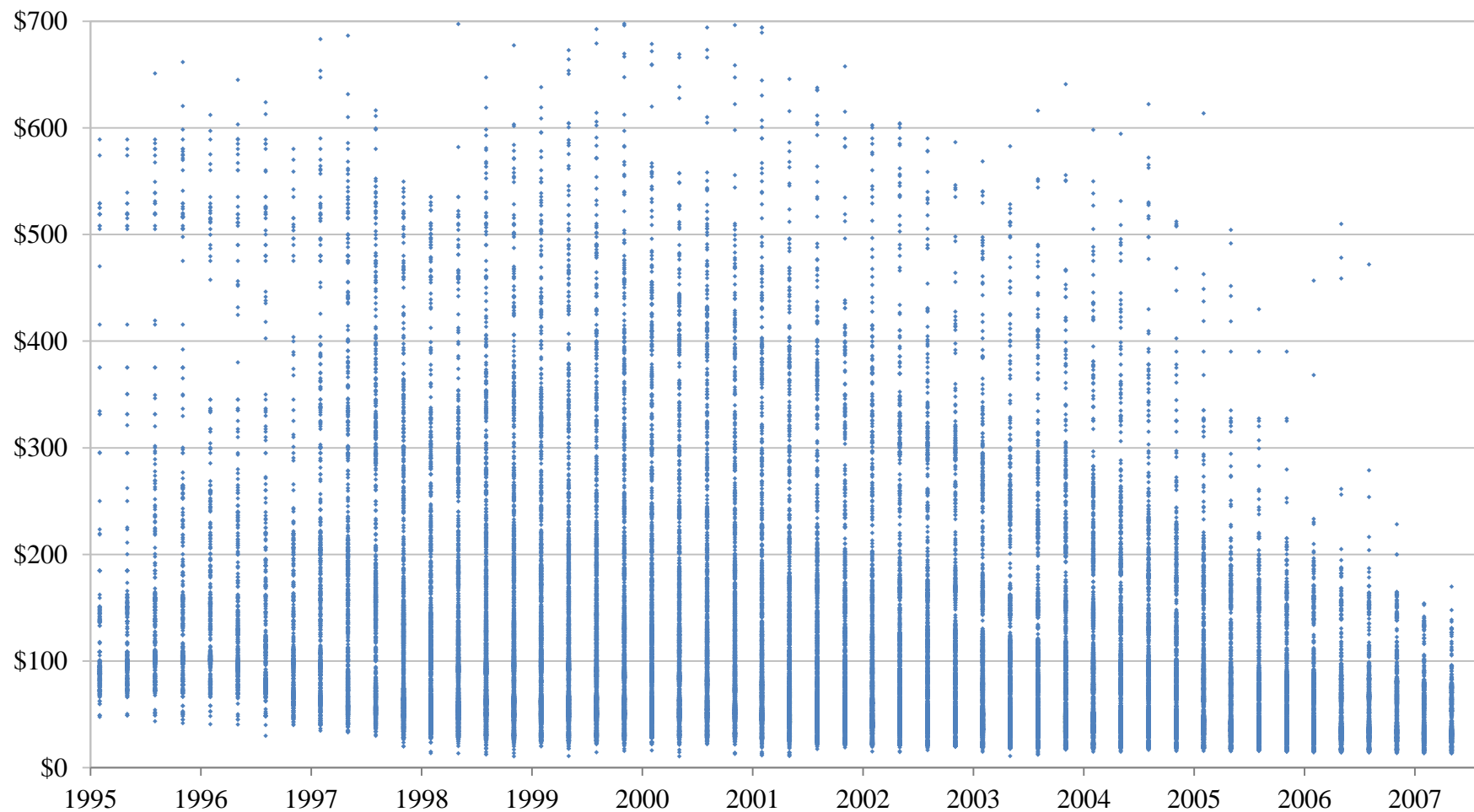
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Exhibit 7B: Notes for Share of Observations with a Gap of More than 5% Between Actual CPT Prices and Prices Predicted by Dr. Leitzinger's Hedonic Regressions

- (1) Gaps were calculated by estimating regressions identical to those reported in Figure 5 of the Leitzinger Report.
- (2) The analysis is based on identical data to those used by Dr. Leitzinger in the analysis presented in Figure 5 of his report;
- (3) The data cover the 1995-2007 time period;
- (4) An observation represents a specific CPT transaction or the total sales for a specific CPT model, customer, and month; this is the format in which the CPT sales data were produced;
- (5) The dependent variable in each regression is the natural log of the price, and the explanatory variables are: sales quantities and a dummy variable for each manufacturer, size, finish (bare/ITC), and aspect ratio (wide/standard screen);
- (6) Gaps were calculated using the following steps: (a) The predicted price was calculated for each observation based on the estimated regression equation; (b) The gap for each observation represents the absolute value of the percentage difference between the predicted price and the actual price; (c) For each quarter, the fraction of observations for which the gap was greater than 5% was calculated and plotted;
- (7) A quarterly regression was excluded if it did not include at least 100 observations.

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**Exhibit 8A: Dispersion in Quarterly Prices Across
All CRT Models and All Customers**



Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LG, SDI, and Toshiba.

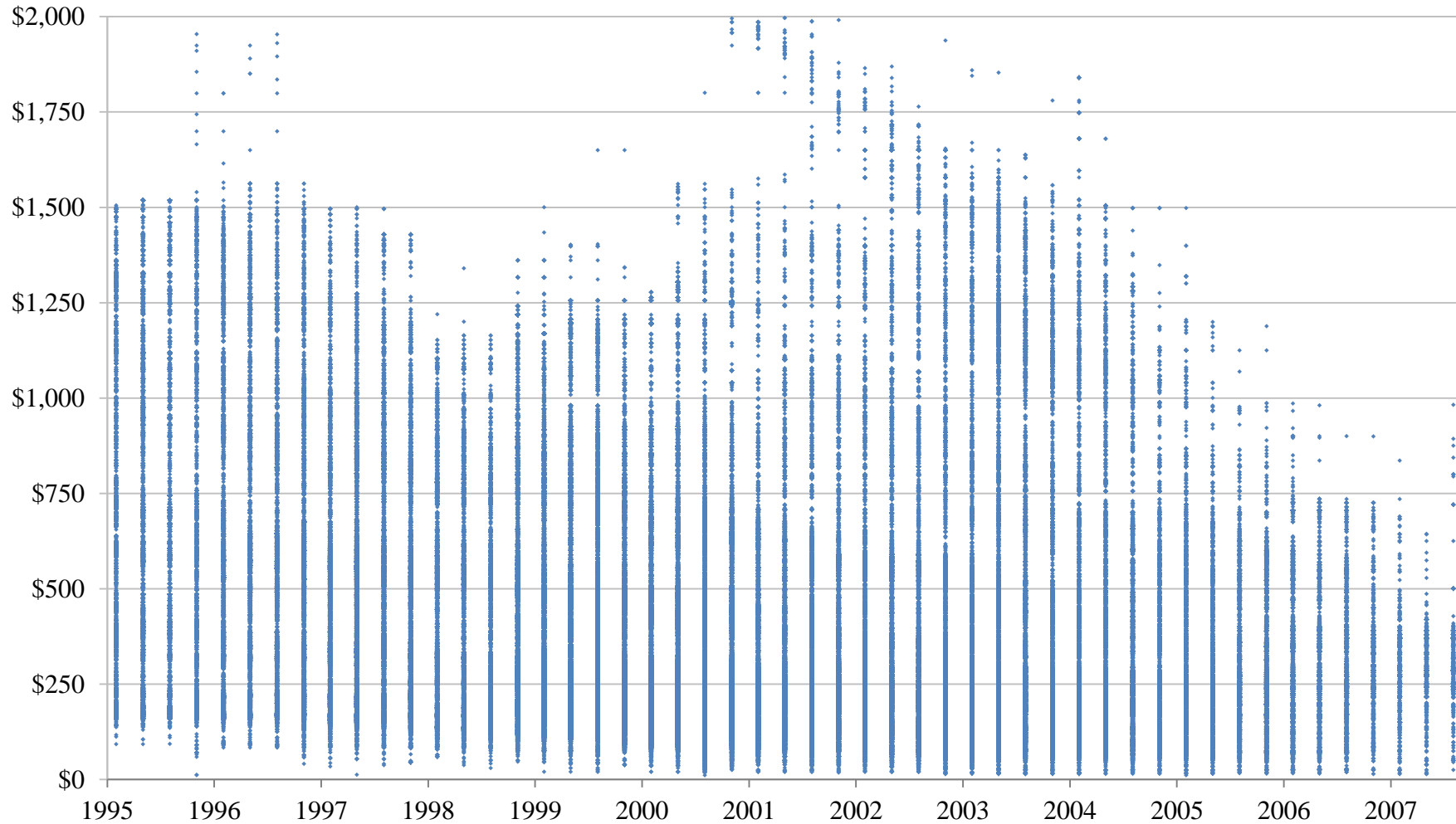
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**Exhibit 8A: Notes for Dispersion in Quarterly Prices Across
All CRT Models and All Customers**

Notes:

- (1) The Global CRT sales data range from Q1 1995 to Q4 2007;
- (2) A point on the above chart represents the quantity-weighted average price for a given CRT model, customer, and quarter;
- (3) Prices were excluded as outliers as follows: for each quarter in which a given CRT model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as “very large price decreases” or “very large price increases,” respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (4) The following observations were also excluded: (a) Sales between integrated entities that sold CRTs; (b) observations for which the model number, customer name, or finish (bare/ITC) were missing; and (c) observations identified by Dr. Leitzinger as outliers;
- (5) A *de minimis* number of observations are outside the bounds of the y-axis.

**Exhibit 8B: Dispersion in Quarterly Prices Across
All CRT Finished Product Models and All Customers**



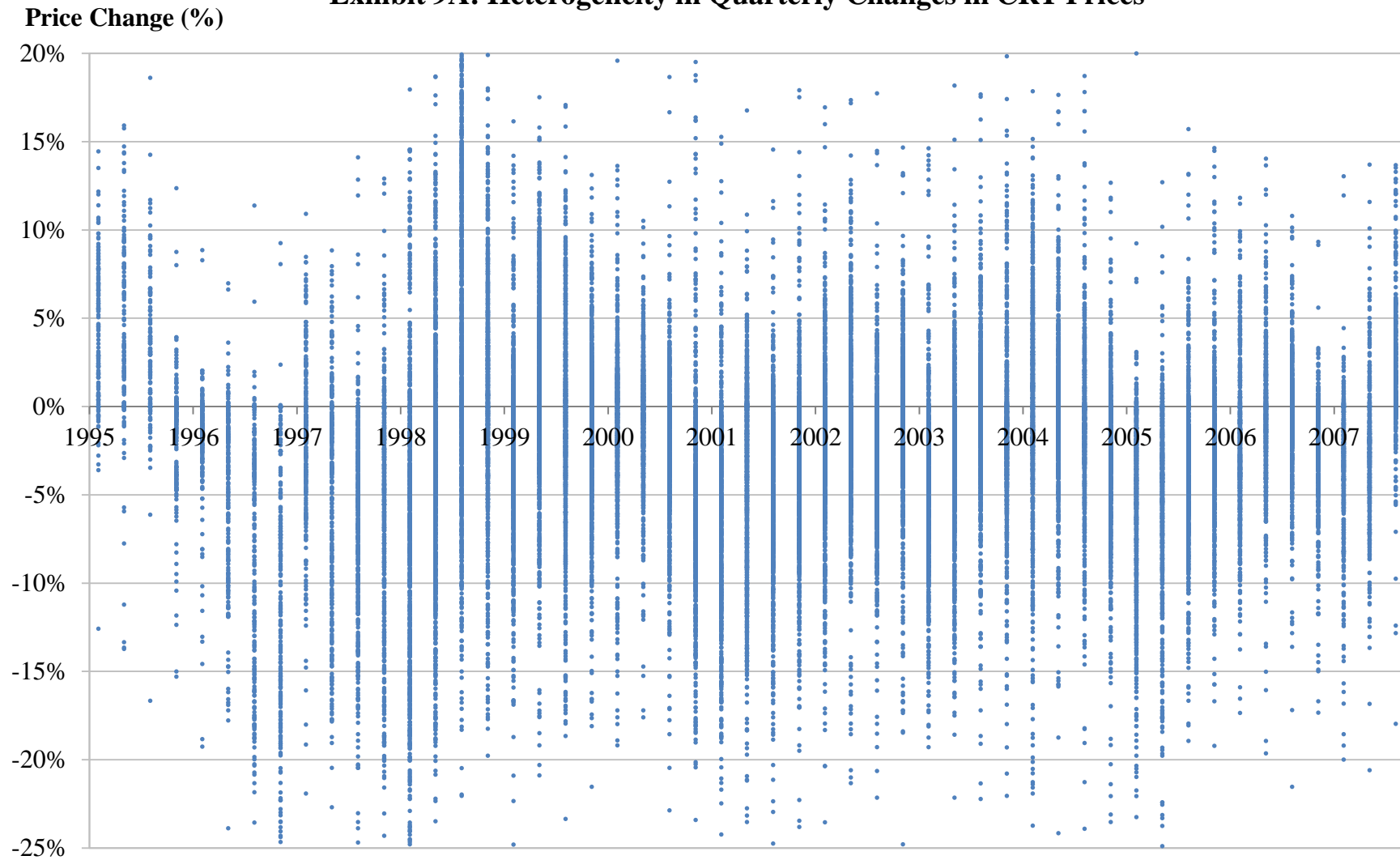
Source: CRT finished product sales data for Hitachi, LG, Panasonic, Philips, SEA, Tatung, and Toshiba.

Exhibit 8B: Notes for Dispersion in Quarterly Prices Across All CRT Finished Product Models and All Customers

Notes:

- (1) The CRT finished product sales data range from Q1 1995 to Q4 2007;
- (2) A point on the above chart represents the quantity-weighted average price for a given CRT finished product model customer, and quarter;
- (3) Prices were excluded as outliers as follows: for each quarter in which a given CRT finished product model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as “very large price decreases” or “very large price increases,” respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (4) The following observations were also excluded: (a) observations for which the model number, customer name, application (TV/monitor), or size were missing; and (b) observations identified by Dr. Leitzinger as outliers;
- (5) A *de minimis* number of observations are outside the bounds of the y-axis.

Exhibit 9A: Heterogeneity in Quarterly Changes in CRT Prices



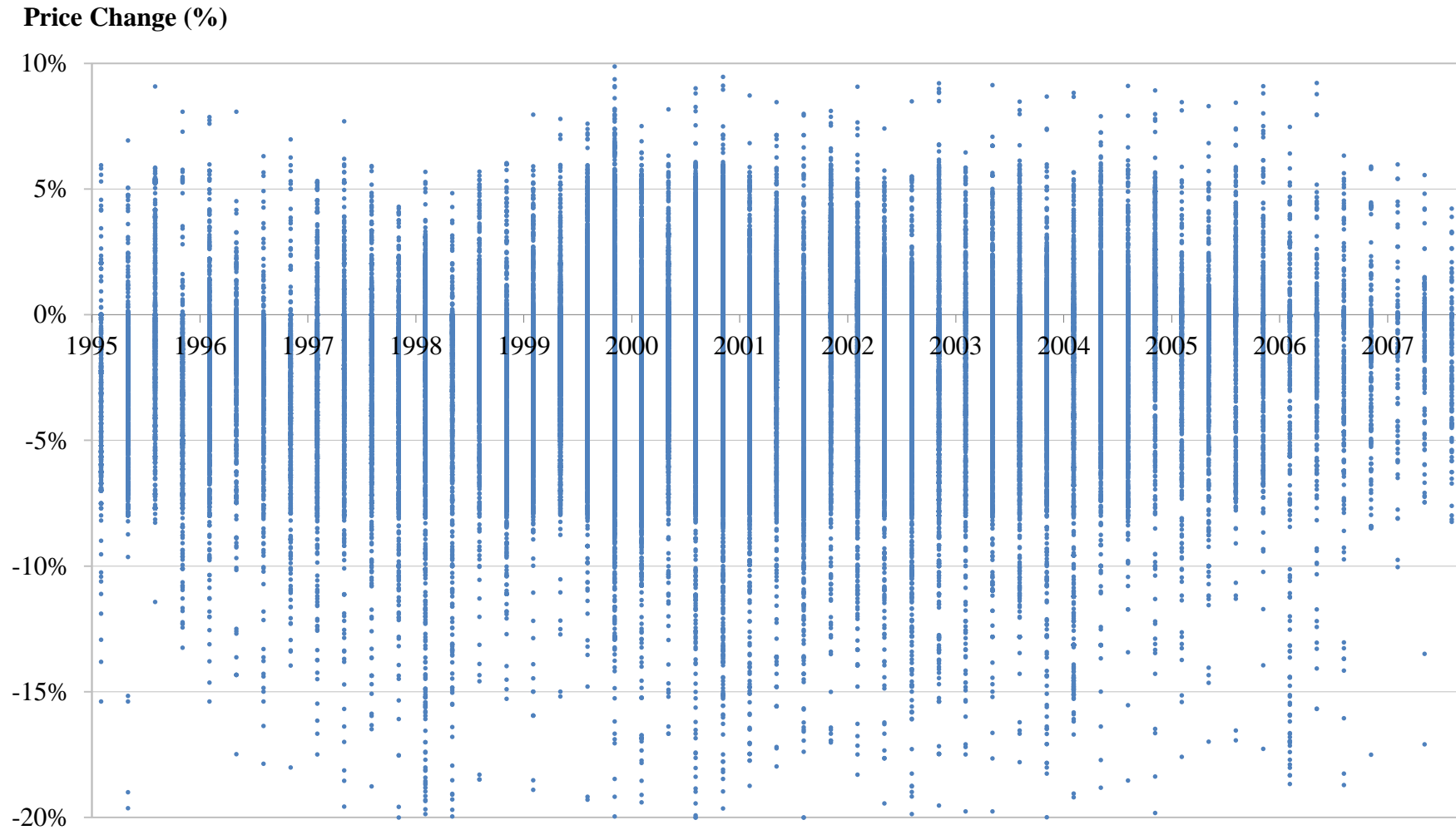
Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LG, SDI, and Toshiba.

Exhibit 9A: Notes for Heterogeneity in Quarterly Changes in CRT Prices

Notes:

- (1) The Global CRT sales data range from Q1 1995 to Q4 2007;
- (2) A point on the above chart represents the quarter-to-quarter price change in the quantity-weighted average price for a given CRT model, customer, and quarter;
- (3) Prices were excluded as outliers as follows: for each quarter in which a given CRT model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as “very large price decreases” or “very large price increases,” respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (4) The following observations were also excluded: (a) sales between integrated entities that sold CRTs; (b) observations for which the model number, customer name, or finish (bare/ITC) were missing; and (c) observations identified by Dr. Leitzinger as outliers;
- (5) A *de minimis* number of observations are outside the bounds of the y-axis.

Exhibit 9B: Heterogeneity in Quarterly Changes in CRT Finished Product Prices



Source: CRT finished product sales data for Hitachi, LG, Panasonic, Philips, SEA, Tatung, and Toshiba.

Exhibit 9B: Notes for Heterogeneity in Quarterly Changes in CRT Finished Product Prices

Notes:

- (1) The CRT finished product sales data range from Q1 1995 to Q4 2007;
- (2) A point on the above chart represents the quarter-to-quarter price change in the quantity-weighted average price for a given CRT finished product model, customer, and quarter;
- (3) Prices were excluded as outliers as follows: for each quarter in which a given CRT finished product model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as “very large price decreases” or “very large price increases,” respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (4) The following observations were also excluded: (a) observations for which the model number, customer name, application (TV/monitor), or size were missing; and (b) observations identified by Dr. Leitzinger as outliers;
- (5) A *de minimis* number of observations are outside the bounds of the y-axis.

Exhibit 10A: Heterogeneity of Quarterly CRT Price Movements by Application, CPT Size, CPT Shape, and Customer Type

	Category 1	Category 2	Fraction of Prices of CRTs in Category 2 that Changed in the Opposite Direction to the Change in the Fisher Price Index for Category 1	Fraction of Prices of CRTs in Category 2 that Did Not Change Despite Change in the Fisher Price Index for Category 1	Sum of the Previous Two Columns
Differences Across Categories	CDT	CPT	16%	12%	28%
	CPT	CDT	17%	1%	18%
	Flat	Curved	22%	7%	29%
	Curved	Flat	16%	4%	20%
	Small	Large	17%	16%	33%
	Large	Small	15%	5%	20%
	Large	Medium	15%	5%	19%
	Medium	Large	17%	13%	29%
	Merchant	Transfer	9%	16%	25%
	Transfer	Merchant	21%	4%	25%
Differences Within Categories	CDT	CDT	4%	0%	4%
	CPT	CPT	10%	6%	15%
	Flat	Flat	3%	2%	6%
	Curved	Curved	13%	5%	18%
	Small	Small	6%	3%	9%
	Medium	Medium	11%	5%	16%
	Large	Large	19%	8%	27%

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LG, SDI, and Toshiba.

Exhibit 10A: Notes for Heterogeneity of Quarterly CRT Price Movements by Application, CPT Size, CPT Shape, and Customer Type

Notes:

- (1) The Global CRT Sales Data range from Q1 1995 to Q4 2007;
- (2) A price observation in this analysis represents the quarter-to-quarter price change in the quantity-weighted average price for a given CRT model, customer, and quarter;
- (3) The quarter-to-quarter change in the Fisher Price Index for CPTs (for example) represents an average across all CPT models and customers of the changes in the prices paid by each customer for each model; the price changes across quarters one and two are averaged in two ways - once using the quarter one sales volumes and once using the quarter two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes;
- (4) The fractions reported in the table were calculated as follows:
 - Step 1: The 25% of quarters that saw the largest absolute quarter-to-quarter changes in the Fisher Price Index for CRTs in Category 1 were identified;
 - Step 2: For each quarter identified in Step 1, (a) the fraction of prices of CRTs in Category 2 (weighted by sales volume) that changed in the opposite direction of the Category 1 Fisher Price Index and (b) the fraction whose prices did not change at all during the same time period were then identified;
 - Step 3: These fractions were averaged across all quarters identified in Step 1 using the sales volumes (by model, customer, and quarter) of CRTs in Category 2 as weights;
- (5) The Flat/Curved and Small/Medium/Large categories refer to CPTs only. The size categories are defined as follows: Small (0-19"), Medium (20-29"), Large (30+");
- (6) Prices were excluded as outliers as follows: for each quarter in which a given CRT model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (7) The following observations were also excluded: (a) sales between integrated entities that sold CRTs; (b) observations for which the model number, customer name, or finish (bare/ITC) were missing; and (c) observations identified by Dr. Leitzinger as outliers.

Exhibit 10B: Heterogeneity of Quarterly CRT Finished Product Price Movements by Application, TV Size, and TV Shape

	Category 1	Category 2	Fraction of Prices of Finished Products in Category 2 that Changed in the Opposite Direction to the Change in the Fisher Price Index for Category 1	Fraction of Prices of Finished Products in Category 2 that Did Not Change Despite Change in the Fisher Price Index for Category 1	Sum of the Previous Two Columns
Differences Across Categories	Monitor	TV	10%	50%	60%
	TV	Monitor	30%	8%	38%
	Flat	Curved	20%	38%	58%
	Curved	Flat	1%	82%	84%
	Small	Large	9%	53%	62%
	Large	Small	9%	42%	51%
	Large	Medium	11%	43%	54%
	Medium	Large	9%	55%	65%
Differences Within Categories	Monitor	Monitor	11%	12%	23%
	TV	TV	9%	43%	52%
	Flat	Flat	4%	16%	20%
	Curved	Curved	9%	41%	50%
	Small	Small	22%	30%	52%
	Medium	Medium	13%	31%	44%
	Large	Large	6%	44%	50%

Source: CRT finished product sales data for Hitachi, LGE, Panasonic, Philips, SEA, Tatung, and Toshiba.

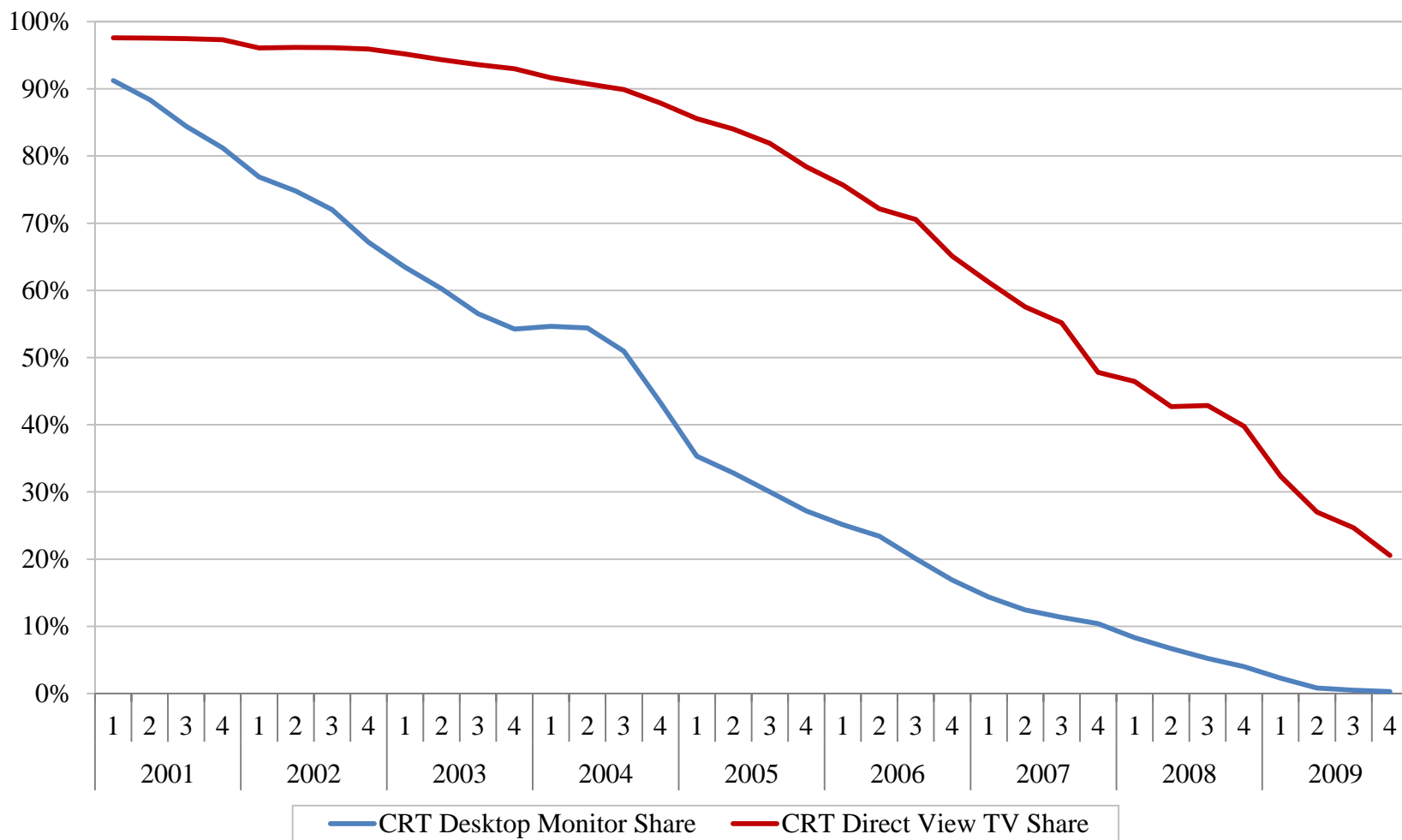
Exhibit 10B: Notes for Heterogeneity of Quarterly CRT Finished Product Price Movements by Application, TV Size, and TV Shape

Notes:

- (1) The CRT finished product sales data range from Q1 1995 to Q4 2007;
- (2) A price observation in this analysis represents the quarter-to-quarter price change in the quantity-weighted average price for a given CRT finished product model, customer, and quarter;
- (3) The quarter-to-quarter change in the Fisher Price Index for TVs (for example) represents an average across all TV models and customers of the changes in the prices paid by each customer for each model; the price changes across quarters one and two are averaged in two ways - once using the quarter one sales volumes and once using the quarter two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes;
- (4) The fractions reported in the table were calculated as follows:
 - Step 1: The 25% of quarters that saw the largest absolute quarter-to-quarter changes in the Fisher Price Index for finished products in Category 1 were identified;
 - Step 2: For each quarter identified in Step 1, (a) the fraction of prices of finished products in Category 2 (weighted by sales volume) that changed in the opposite direction of the Category 1 Fisher Price Index and (b) the fraction whose prices did not change at all during the same time period were then identified;
 - Step 3: These fractions were averaged across all quarters identified in Step 1 using the sales volumes (by model, customer, manufacturer, and quarter) of finished products in Category 2 as weights;
- (5) The Flat/Curved and Small/Medium/Large categories refer to TVs only. The size categories are defined as follows: Small (0-18"), Medium (19-27"), Large (28+");
- (6) Prices were excluded as outliers as follows: for each quarter in which a given CRT finished product model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (7) The following observations were also excluded: (a) observations for which the model number, customer name, application (TV/monitor), or size were missing; and (b) observations identified by Dr. Leitzinger as outliers.

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**Exhibit 11A: CRT Share of Worldwide Finished Product Sales by Application
(2001-2009)**



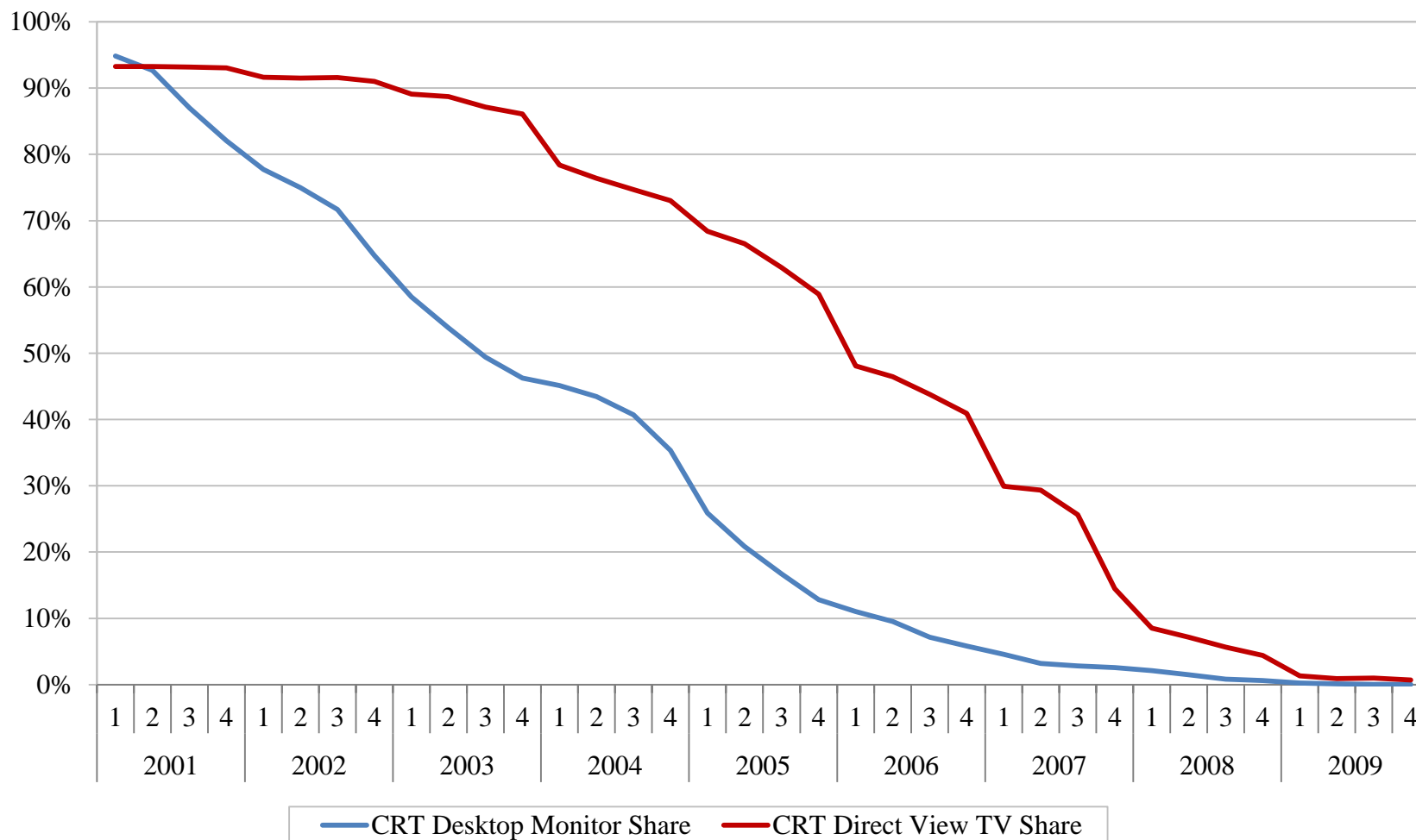
Sources: (1) iSuppli Worldwide Monitor Market Tracker Database; (2) iSuppli Television Systems Market Tracker Database.

Notes: (1) CRT Direct View TV Share represents CRT TV shipments as a percentage of CRT, LCD, Plasma, and Projection TV shipments; (2) CRT Desktop Monitor Share represents CRT monitor shipments as a percentage of CRT and LCD monitor shipments.

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**Exhibit 11B: CRT Share of North American Finished Product Sales by Application
(2001-2009)**

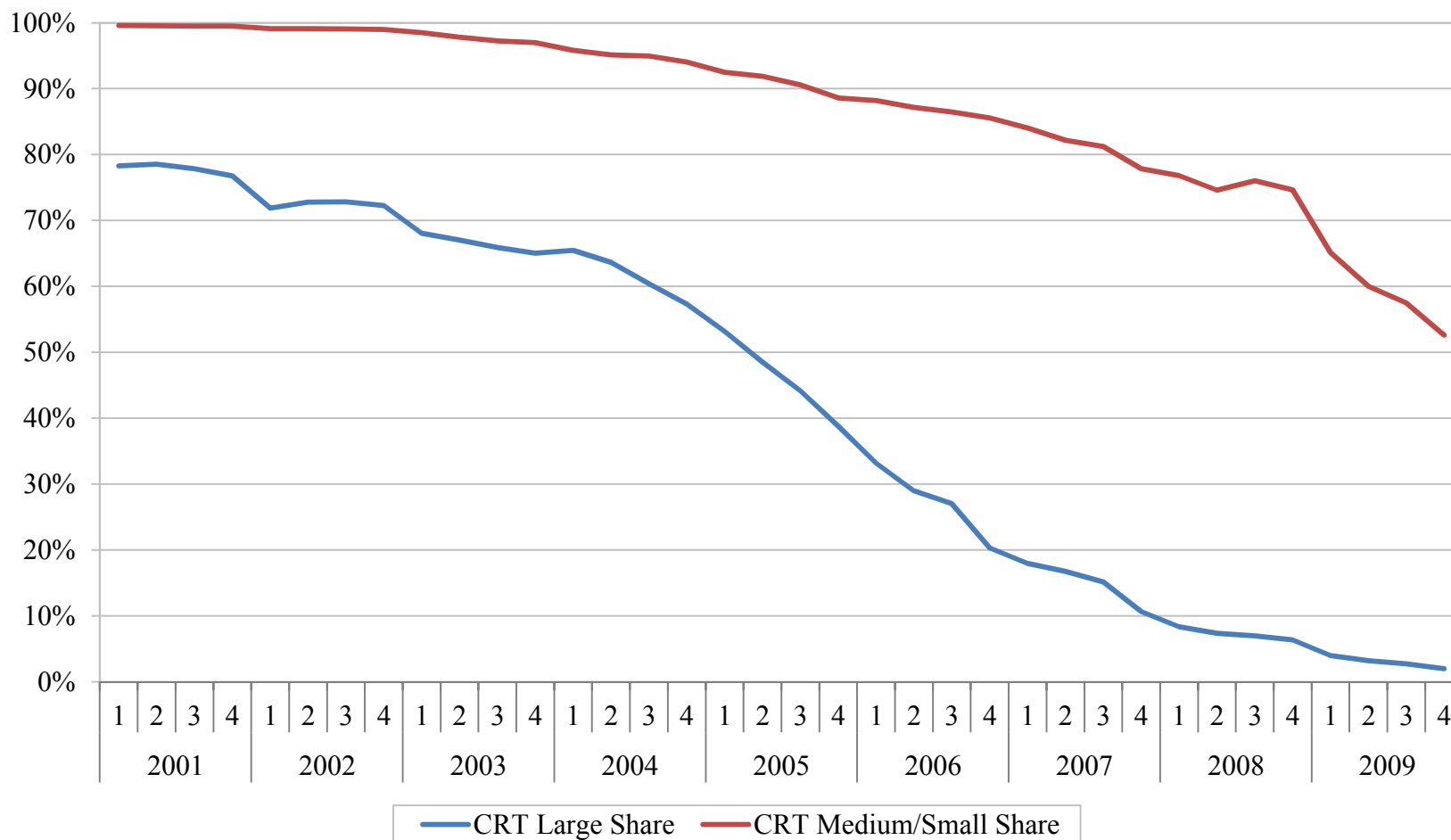


Sources: (1) iSuppli Worldwide Monitor Market Tracker Database; (2) iSuppli Television Systems Market Tracker Database.

Notes: (1) CRT Direct View TV Share represents CRT TV shipments as a percentage of CRT, LCD, Plasma, and Projection TV shipments; (2) CRT Desktop Monitor Share represents CRT monitor shipments as a percentage of CRT and LCD monitor shipments.

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**Exhibit 12A: CRT TV Share of Worldwide TV Sales by Size
(2001-2009)**



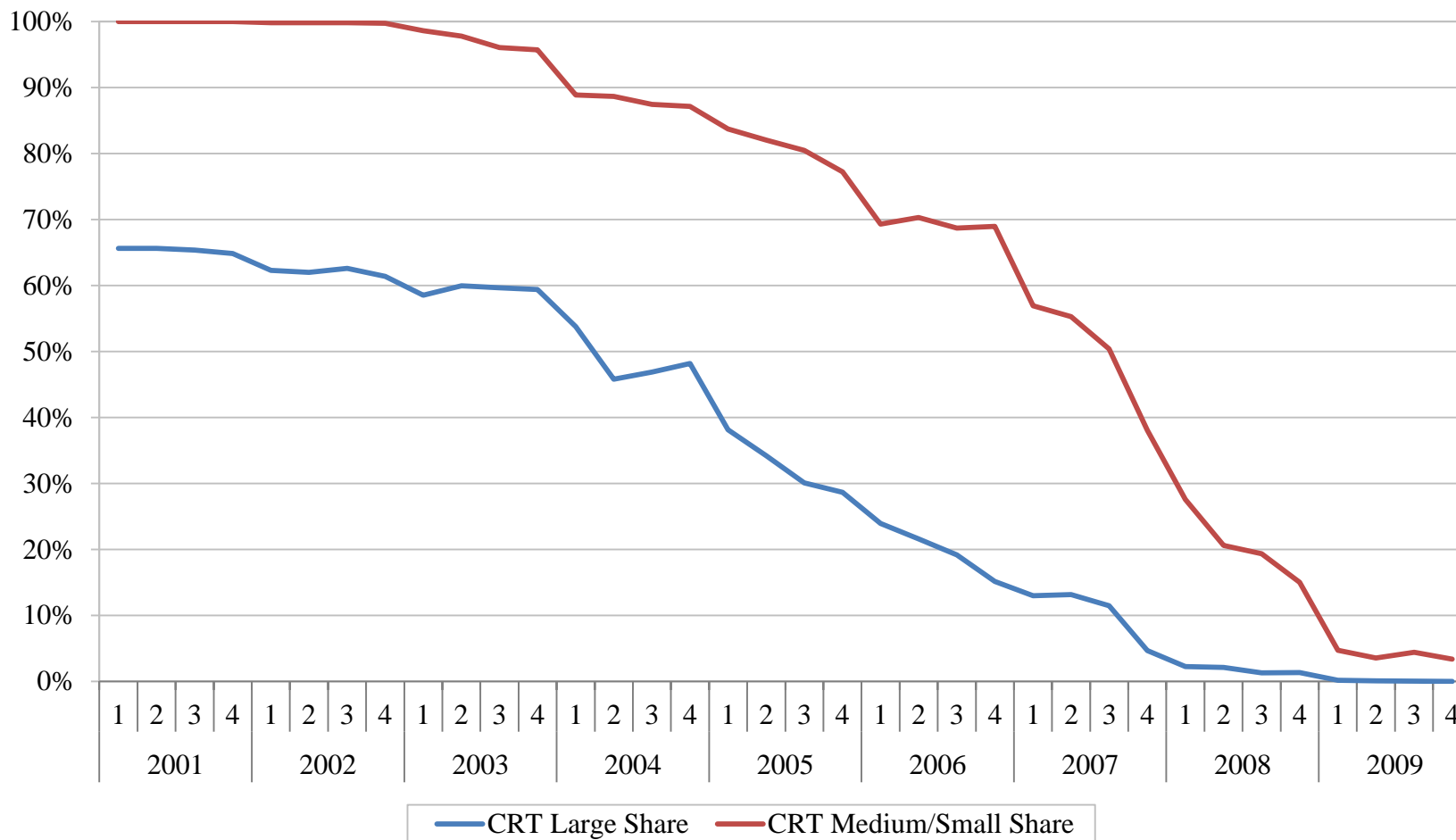
Source: iSuppli TV Systems Market Tracker.

Notes: (1) The size categories are defined as follows: Medium/Small (0-29"), Large (30+"); (2) Projection TVs are considered Large; (3) The shares represent worldwide Large (or Medium/Small) CRT TV shipments as a percentage of worldwide Large (or Medium/Small) CRT, LCD, Projection, and Plasma TV shipments.

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**Exhibit 12B: CRT TV Share of North American TV Sales by Size
(2001-2009)**

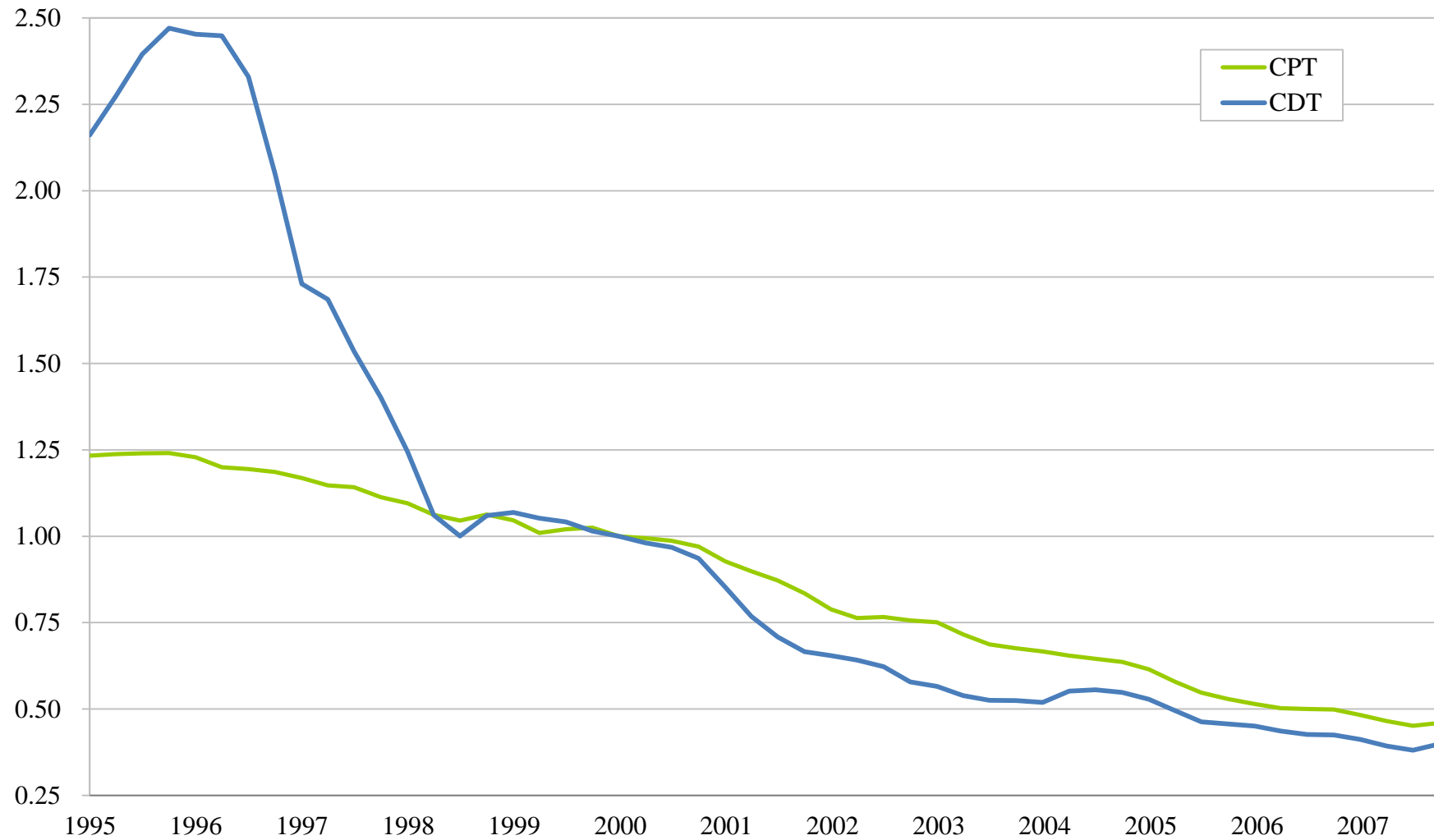


Source: iSuppli TV Systems Market Tracker.

Notes: (1) The size categories are defined as follows: Medium/Small (0-29"), Large (30+"); (2) Projection TVs are considered Large; (3) The shares represent North American Large (or Medium/Small) CRT TV shipments as a percentage of North American Large (or Medium/Small) CRT, LCD, Projection, and Plasma TV shipments.

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Exhibit 13: Fisher Indices of Global CPT and CDT Prices



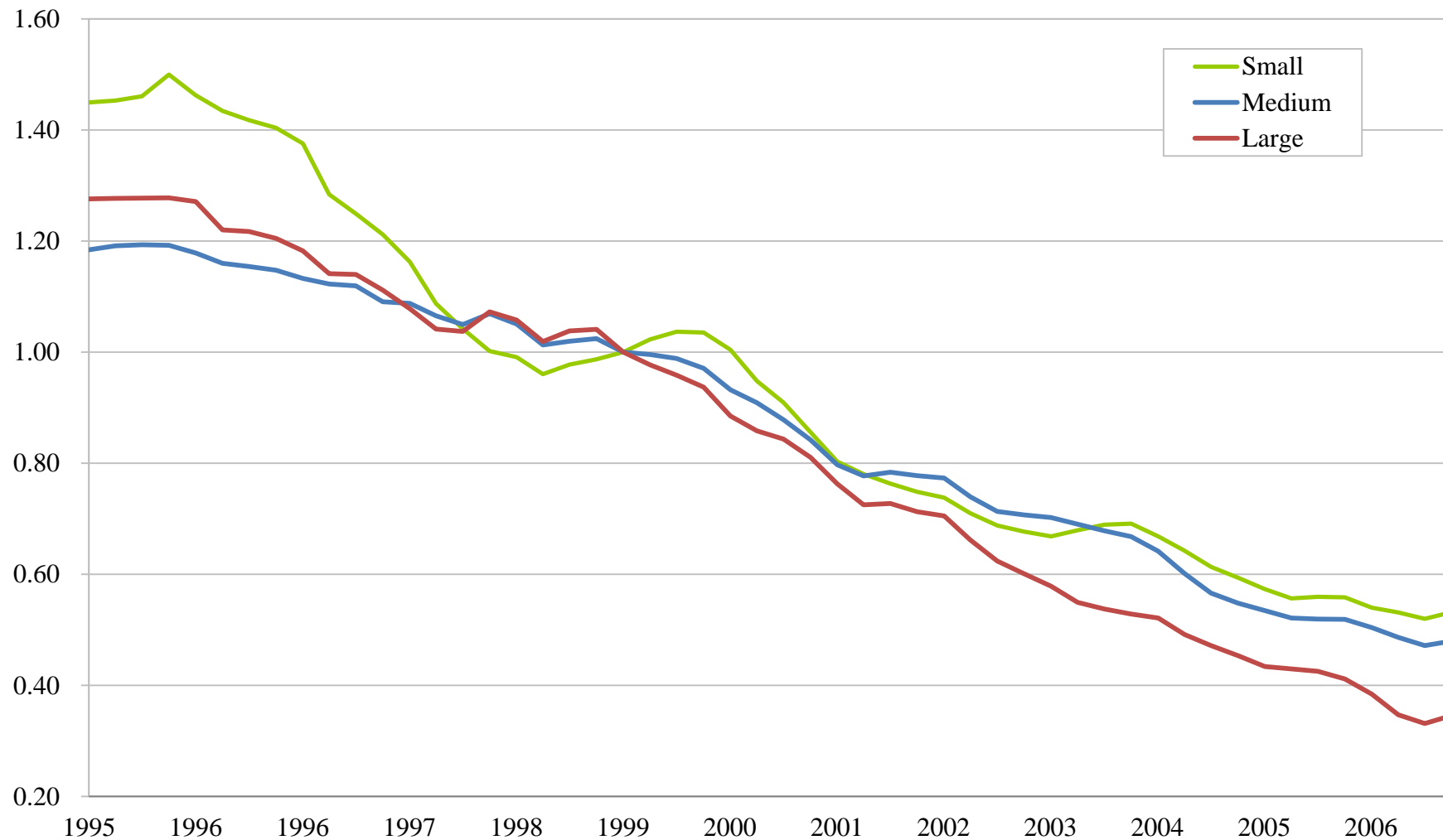
Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LG, SDI, and Toshiba.

Exhibit 13: Notes for Fisher Indices of Global CPT and CDT Prices

Notes:

- (1) The Global CRT Sales Data range from Q1 1995 to Q4 2007;
- (2) The quarter-to-quarter change in the Fisher Price Index for CPTs (for example) represents an average across all CPT models and customers of the changes in the prices paid by each customer for each model; the price changes across quarters one and two are averaged in two ways - once using the quarter one sales volumes and once using the quarter two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes;
- (3) Each index is set to 1.0 in Q1 2000;
- (4) The graph shows the longest uninterrupted period for which data were available during the class period;
- (5) Prices were excluded as outliers as follows: for each quarter in which a given CRT model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as “very large price decreases” or “very large price increases,” respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (6) The following observations were also excluded: (a) Sales between integrated entities that sold CRTs; (b) observations for which the model number, customer name, or finish (bare/ITC) were missing; and (c) observations identified by Dr. Leitzinger as outliers.

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Exhibit 14: Fisher Indices of CPT Prices by Size

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LG, SDI, and Toshiba.

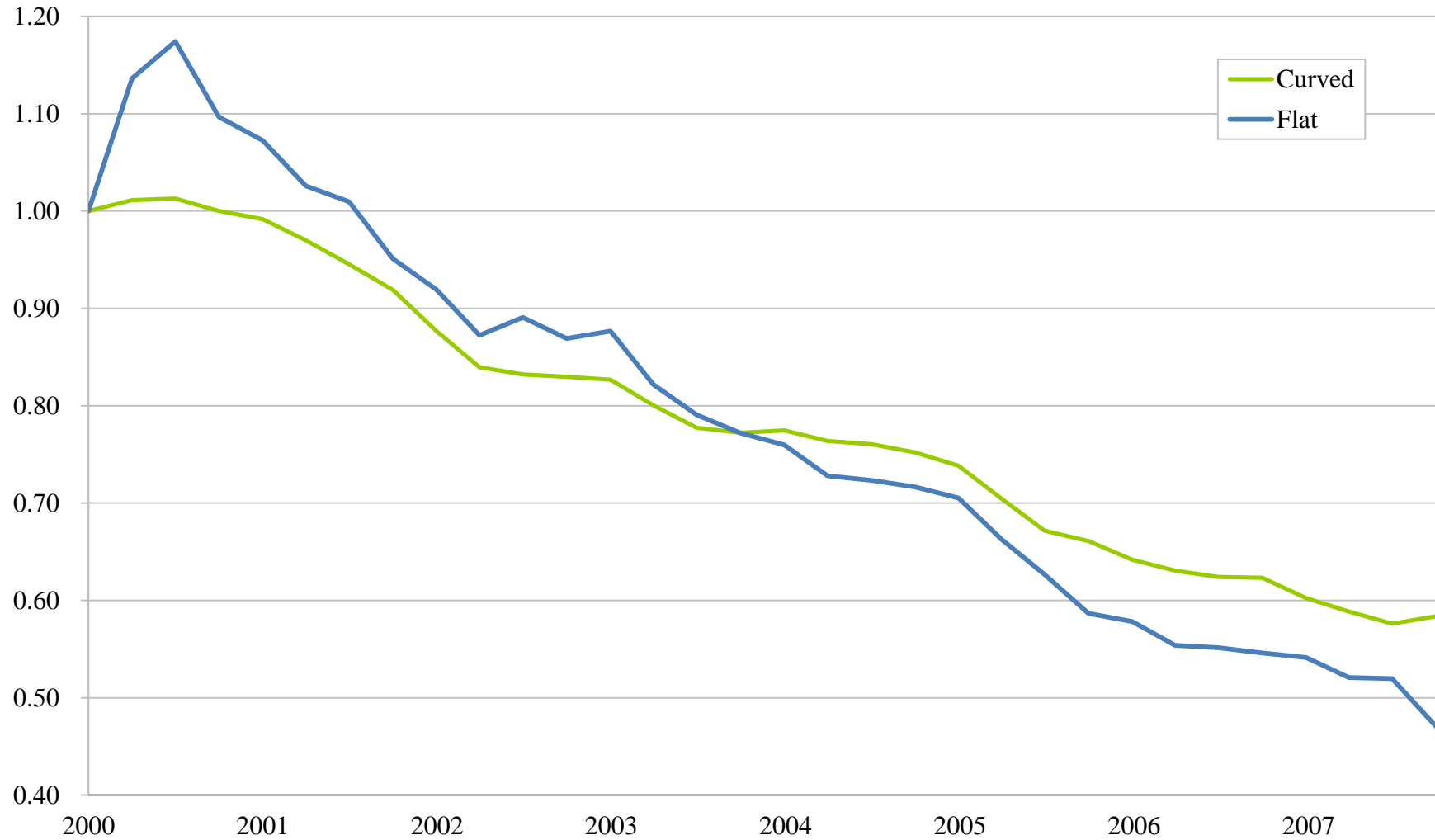
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Exhibit 14: Notes for Fisher Indices of CPT Prices by Size

Notes:

- (1) The Global CRT Sales Data range from Q1 1995 to Q4 2007;
- (2) The size categories are defined as follows: Small (0-19"), Medium (20-29"), Large (30+");
- (3) The quarter-to-quarter change in the Fisher Price Index for large CPTs (for example) represents an average across all CPT models and customers of the changes in the prices paid by each customer for each model; the price changes across quarters one and two are averaged in two ways - once using the quarter one sales volumes and once using the quarter two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes;
- (4) Each index is set to 1.0 in Q1 2000;
- (5) The graph shows the longest uninterrupted period for which data were available during the class period;
- (6) Prices were excluded as outliers as follows: for each quarter in which a given CRT model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (7) The following observations were also excluded: (a) sales between integrated entities that sold CRTs; (b) observations for which the model number, customer name, or finish (bare/ITC) were missing; and (c) observations identified by Dr. Leitzinger as outliers.

Exhibit 15: Fisher Indices of Flat and Curved CPT Prices



Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LG, SDI, and Toshiba.

Exhibit 15: Notes for Fisher Indices of Flat and Curved CPT Prices

Notes:

- (1) The Global CRT Sales Data range from Q1 1995 to Q4 2007;
- (2) The quarter-to-quarter change in the Fisher Price Index for flat CPTs (for example) represents an average across all CPT models and customers of the changes in the prices paid by each customer for each model; the price changes across quarters one and two are averaged in two ways - once using the quarter one sales volumes and once using the quarter two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes;
- (3) Each index is set to 1.0 in Q1 2000;
- (4) The graph shows the longest uninterrupted period for which data were available during the class period;
- (5) Prices were excluded as outliers as follows: for each quarter in which a given CRT model was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as “very large price decreases” or “very large price increases,” respectively. Prices for a given model, customer, and quarter were excluded as outliers if: (a) the price for the model and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer, or vice versa; (b) it was the first quarter in which the model was sold to the customer and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer; or (c) it was the last quarter in which the model was sold to the customer and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer;
- (6) The following observations were also excluded: (a) sales between integrated entities that sold CRTs; (b) observations for which the model number, customer name, or finish (bare/ITC) were missing; and (c) observations identified by Dr. Leitzinger as outliers.

Exhibit 16: Heterogeneity of Quarterly CRT Price Movements by Region (North America vs. ROW)

Category 1	Category 2	Fraction of Prices of CRTs in Category 2 that Changed in the Opposite Direction to the Change in the Fisher Price Index for Category 1	Fraction of Prices of CRTs in Category 2 that Did Not Change Despite Change in the Fisher Price Index for Category 1	Sum of the Previous Two Columns
NA CPTs	Foreign CPTs	20%	8%	28%
Foreign CPTs	NA CPTs	12%	26%	39%

Source: Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LG, SDI, and Toshiba.

**Exhibit 16: Notes for Heterogeneity of Quarterly CRT Price Movements by Region
(North America vs. ROW)**

Notes:

- (1) The Global CRT sales data range from Q1 1995 to Q4 2007;
- (2) The geographic region of a sale was classified as either North American or ROW using the bill-to country; if the bill-to country was missing, the ship-to country was used;
- (3) A price observation in this analysis represents the quarter-to-quarter price change in the quantity-weighted average price for a given CRT model, customer, and quarter;
- (4) The quarter-to-quarter change in the Fisher Price Index for North American CRTs (for example) represents an average across all North American CRT models and retailers of the changes in the prices charged by each retailer for each model in that region; the price changes across quarters one and two are averaged in two ways - once using the quarter one sales volumes and once using the quarter two sales volumes - and the change in the Fisher Price Index represents the geometric mean of the two average price changes;
- (5) The fractions reported in the table were calculated as follows:
 - Step 1: The 25% of quarters that saw the largest absolute quarter-to-quarter changes in the Fisher Price Index of CRTs in Category 1 were identified;
 - Step 2: For each quarter identified in Step 1, (a) the fraction of prices of CRTs in Category 2 (weighted by sales volume) that changed in the opposite direction of the Category 1 Fisher Price Index and (b) the fraction whose prices did not change at all during the same time period were then identified;
 - Step 3: These fractions were averaged across all quarters identified in Step 1 using the sales volumes (by model, customer, manufacturer, geographic region, and quarter) of CRTs in Category 2 as weights;
- (6) Prices were excluded as outliers as follows: for each quarter in which a given CRT model was sold to a given customer in a given region, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was sold to the same customer in the same region. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as “very large price decreases” or “very large price increases,” respectively. Prices for a given model, customer, region, and quarter were excluded as outliers if: (a) the price for the model, customer, and region experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which that model was sold to that customer in that region, or vice versa; (b) it was the first quarter in which the model was sold to the customer in that region and the price experienced a very large increase or decrease in the next quarter in which that model was sold to that customer in that region; or (c) it was the last quarter in which the model was sold to the customer in that region and the price experienced a very large increase or decrease from the previous quarter in which that model was sold to that customer in that region;
- (7) The following observations were also excluded: (a) sales between integrated entities that sold CRTs; (b) observations for which the model number, customer name, or finish (bare/ITC) were missing; and (c) observations identified by Dr. Leitzinger as outliers.

**Exhibit 17: Correlation Between CRT Prices and Atmospheric
Chlorine Gas Levels**

Correlation Coefficients		
CDTs		
CDT 14	chlorine	0.92
CDT 15	chlorine	0.93
CDT 17	chlorine	0.93
CDT 19	chlorine	0.91
CPTs		
CPT 14	chlorine	0.98
CPT 15	chlorine	0.99
CPT 20	chlorine	0.99
CPT 21	chlorine	0.97
CPT 25	chlorine	0.97
CPT 26	chlorine	0.96
CPT 29	chlorine	0.97
CPT 34	chlorine	0.99

Source: (1) Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LGE, SDI, and Toshiba; (2) National Oceanic and Atmospheric Administration (NOAA).

Notes: (1) The CPT and CDT categories listed in this exhibit are described by Dr. Leitzinger as "major" CRTs, and are included in Figure 8 of Dr. Leitzinger's report; (2) "Chlorine" refers to atmospheric chlorine gas concentration levels reported by the NOAA; (3) The correlation coefficients reported are between the quarterly average (Fisher) price index of each CRT category and chlorine gas levels typically between 1995 and 2007; (4) The Fisher price indices are the same as that used in the analysis presented by Dr. Leitzinger in Figure 8 of his report.

Exhibit 18: Target Prices Are Poor Predictors of Actual Prices of Non-Targeted CRT Categories

Non-Targeted CRT Categories Identified by Dr. Leitzinger	Minimum Probability of Errors Greater than X% when Predicting Prices of CRTs in Non-Targeted Categories Based on Target Prices			Sales Dollars (in Millions) 1995-2007
	X=5%	X=10%	X=15%	
CDTs				
CDT 10	30%	5%	0%	\$105
CDT 21	45%	13%	3%	\$1,178
CPTs				
CPT 6	53%	21%	7%	\$55
CPT 10	71%	46%	27%	\$391
CPT 16	51%	19%	5%	\$57
CPT 17	11%	0%	0%	\$69
CPT 26	18%	1%	0%	\$1,842
CPT 34	78%	58%	41%	\$4,089
CPT 36	66%	38%	19%	\$939
CPT 38	82%	64%	48%	\$1,584
Weighted Average	62%	40%	27%	\$10,310

Sources: (1) Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LGE, SDI, and Toshiba; (2) Leitzinger Report backup: "Target Prices_part1.csv," "Target Prices_part2.csv," and "Target Prices_part3.csv."

Exhibit 18: Notes for Target Prices Are Poor Predictors of Actual Prices of Non-Targeted CRT Categories

Notes:

- (1) CRT "categories" were defined in the same manner as in the analysis presented in Figure 9 of Dr. Leitzinger's report. Specifically, Dr. Leitzinger defined categories by application (CDT/CPT) and size as "targeted" if he identified at least one alleged target price for a CRT in that category and "non-targeted" if he did not identify any alleged target prices for any CRT in that category;
- (2) Quarterly-weighted actual prices were calculated by CRT model, customer, and quarter for each model in each non-targeted category using global CRT sales data for Q1 1995 to Q4 2007;
- (3) A series of regressions were then estimated. In each regression, the quantity weighted average price paid by each customer for each CRT model in a non-targeted category in a given quarter is the dependent variable, and the alleged target price of a "comparable" CRT in a targeted group in the same quarter is the independent variable. (For the purpose of this analysis, a CRT model in a targeted category is considered to be "comparable" to a CRT model in a non-targeted category if both were produced by the same firm and had the same finish and application.) For example, sales prices of 34-inch CPT (a non-targeted category) models were regressed on target prices of comparable 28-inch CPTs (a targeted category). Separately, sales prices of 34-inch CPT models were regressed on target prices of comparable models in other targeted CPT categories. For each regression, the probability that the predicted price would differ from the actual price by at least X% was estimated based on the 5% lower bound on the variance of the prediction errors. (Thus, the results are statistically significant at the 95% level.) From among these regressions, the lowest probability of error was identified for each X% threshold and reported for 34-inch CPTs in this exhibit. A similar analysis was performed for all other non-targeted categories.
- (4) Regressions with fewer than 20 observations were excluded; non-targeted CRT categories for which no regression included 20 observations were excluded from the table;
- (5) The following observations were excluded: (a) observations for which the model number, customer name, or finish were missing and (b) observations identified by Dr. Leitzinger as outliers.

Exhibit 19A: The Average Price of Each CDT Size Category Is a Poor Predictor of Individual CDT Prices in the Same and Other CDT Size Categories

CDT Size Category 1	X%	Probability of Errors Greater than X% when Predicting Prices of Size Category 1 CDTs Based on the Average Prices of CDT Size Category:			
		CDT 14	CDT 15	CDT 17	CDT 19
CDT 14	5%	89%	89%	91%	93%
	10%	79%	79%	83%	87%
	15%	68%	68%	74%	80%
CDT 15	5%	97%	97%	97%	98%
	10%	94%	94%	95%	95%
	15%	92%	92%	92%	93%
CDT 17	5%	89%	89%	88%	89%
	10%	77%	79%	77%	78%
	15%	67%	68%	66%	68%
CDT 19	5%	80%	85%	74%	70%
	10%	61%	70%	51%	43%
	15%	44%	57%	33%	24%

Sources: (1) Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LGE, SDI, and Toshiba; (2) Leitzinger Report backup: "Figure 8 Data.xlsx."

Notes: (1) Category 1 CDT prices are the quantity-weighted average sales prices for a given CDT model of a given size, sold to a given customer, in a given quarter; (2) Category 1 CDT prices are predicted using a regression in which the prices of a particular Category 1 CDT is the dependent variable and the average (Fisher Index) price of the same or another CDT size category is the independent variable; (3) The Fisher Indices are the same as those used in Figure 8 of the Leitzinger Report; (4) All prices were calculated using global CRT sales data for Q1 1995 to Q4 2007; (5) Observations for which the model number, customer name, or finish were missing were excluded; observations identified by Leitzinger as outliers were also excluded.

Exhibit 19B: The Average Price of Each CPT Size Category Is a Poor Predictor of Individual CPT Prices in the Same and Other CPT Size Categories

CPT Size Category 1	X%	Probability of Errors Greater than X% when Predicting Prices of Size Category 1 CPTs Based on the Average Prices of CPT Size Category:							
		CPT 14	CPT 15	CPT 20	CPT 21	CPT 25	CPT 26	CPT 29	CPT 34
CPT 14	5%	71%	71%	73%	76%	75%	74%	74%	73%
	10%	45%	46%	48%	54%	52%	51%	50%	50%
	15%	26%	27%	29%	36%	33%	32%	31%	31%
CPT 15	5%	69%	67%	67%	70%	68%	65%	65%	65%
	10%	43%	40%	40%	44%	40%	36%	36%	37%
	15%	24%	21%	20%	24%	21%	17%	17%	18%
CPT 20	5%	76%	76%	76%	78%	77%	77%	77%	76%
	10%	54%	54%	54%	57%	56%	56%	56%	55%
	15%	36%	36%	36%	39%	38%	38%	38%	37%
CPT 21	5%	91%	91%	91%	91%	91%	91%	91%	91%
	10%	83%	83%	83%	83%	83%	83%	83%	83%
	15%	74%	74%	74%	74%	74%	75%	74%	74%
CPT 25	5%	97%	97%	97%	97%	97%	97%	97%	97%
	10%	94%	94%	94%	94%	94%	94%	94%	94%
	15%	92%	92%	92%	92%	92%	92%	92%	92%
CPT 26	5%	49%	47%	37%	43%	46%	28%	33%	32%
	10%	17%	15%	8%	12%	14%	3%	5%	5%
	15%	4%	3%	1%	2%	3%	0%	0%	0%
CPT 29	5%	95%	95%	95%	94%	95%	95%	94%	95%
	10%	89%	89%	89%	89%	89%	89%	89%	89%
	15%	84%	84%	84%	84%	84%	84%	84%	84%
CPT 34	5%	84%	84%	84%	84%	84%	84%	84%	84%
	10%	70%	69%	69%	68%	69%	68%	69%	68%
	15%	56%	55%	56%	54%	54%	54%	55%	54%

Sources: (1) Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LPD, LGE, SDI, and Toshiba; (2) Leitzinger Report backup: "Figure 8 Data.xlsx."

Notes: (1) Category 1 CPT prices are the quantity-weighted average sales prices for a given CPT model of a given size, sold to a given customer, in a given quarter; (2) Category 1 CPT prices are predicted using a regression in which the prices of a particular Category 1 CPT is the dependent variable and the average (Fisher Index) price of the same or another CPT size category is the independent variable; (3) The Fisher Indices are the same as those used in Figure 8 of the Leitzinger Report; (4) All prices were calculated using global CRT sales data for Q1 1995 to Q4 2007; (5) Observations for which the model number, customer name, or finish were missing were excluded; observations identified by Leitzinger as outliers were also excluded.

**Exhibit 20A: Effect of Disaggregating the Corrected Dr. Leitzinger
Pass-through Model**

	Monitors	TVs		
		<u>SMALL</u>	<u>MEDIUM</u>	<u>LARGE</u>
Regression 1: Estimate for all CRT products	Positive & Significant			
Regression 2: Estimates by application	Positive & Significant	Not Statistically Significant		
Regression 3: Estimates by application and size	Positive & Significant	Not Statistically Significant	Negative & Significant	Not Statistically Significant

Notes:

(1) Statistical significance was evaluated at the 10% level or lower (i.e., the pass-through coefficient must have a p-value of 0.1 or less to be considered to be statistically significant); (2) Results in boxes that cover multiple products indicate regressions for which pass-through rates were assumed to be equal across those products; (3) TV size categories are defined as follows: Small (0-18"), Medium (19-27"), Large (28+").

**Exhibit 20B: CRT Cost Pass-through Estimates with Corrected Dr.
Leitzinger Pass-through Model**

Regression 1: Estimate of average pass-through coefficient (TVs and monitors pooled)	0.349* (0.0559)
<i>Observations</i>	304
<i>R-squared</i>	0.865
Regression 2: Estimates of separate pass-through coefficients for monitors and TVs:	
Monitors	0.623*** (0.00353)
TVs	-0.185 (0.512)
<i>Observations</i>	304
<i>R-squared</i>	0.868
Regression 3: Estimates of separate pass-through coefficients for monitors and TVs of different sizes:	
Monitors	0.529** (0.0130)
Small TVs	-0.558 (0.444)
Medium TVs	-1.774*** (0.00351)
Large TVs	-0.226 (0.419)
<i>Observations</i>	304
<i>R-squared</i>	0.872

Sources:

(1) Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LG, LPD, SDI, and Toshiba; (2) CRT finished product sales data for Hitachi, LG, Panasonic, Philips, SEA, Tatung, and Toshiba; (3) DisplaySearch Data; Bureau of Labor Statistics; Bank of Korea; OECD StatExtracts Database.

Exhibit 20B: Notes for CRT Cost Pass-Through Estimates with Corrected Leitzinger Pass-through Model

Notes:

- (1) Pass-through Regression 1 has as its dependent variable the log of the quantity-weighted average CRT finished product price for a given manufacturer, application (TV/monitor), size, and quarter. The independent variables include all of the regressors included in Dr. Leitzinger's pass-through analysis: his estimate of the log of the relevant CRT costs for the given manufacturer, application, size, and quarter; the one-quarter lagged log of LCD finished product prices for the given application and quarter, a quarterly production price index for TV tuners interacted with an indicator for TVs, the quarterly growth in desktop PC worldwide shipments interacted with an indicator for CDTs, the quarterly unemployment rate for G7 member countries, and the quarterly growth of industrial production for G7 member countries. (See Leitzinger Report, Figure 13.) Additionally, product fixed effects were added, where a "product" is defined by a unique combination of manufacturer, application, and size (which is how Dr. Leitzinger defined cross-sectional units in his pass-through analysis);
- (2) Regression 2 differs from Regression 1 in that it uses a dummy variable for TVs to estimate separate pass-through rates for monitors and TVs;
- (3) Regression 3 differs from the others in that it uses dummy variables to estimate separate pass-through rates for monitors and for TVs of different sizes;
- (4) P-values are reported in parentheses; "*" indicates significance at the 10% level; "***" indicates significance at the 5% level; and "****" indicates significance at the 1% level;
- (5) The above regressions use data employed by Dr. Leitzinger in the pass-through analysis presented in Figure 13 of his report. These data cover the period Q2 1999 through Q4 2007.

Exhibit 21A: Effect of Disaggregating Dr. Leitzinger's Overcharge Analysis of Global CRT Sales

	CDTs	CPTs		
		<u>SMALL</u>	<u>MEDIUM</u>	<u>LARGE</u>
Regression 1: Original Leitzinger overcharge estimate (all CRTs)	Positive and Significant			
Regression 2: Overcharge estimates by application (CDTs vs. CPTs)	Not Statistically Significant	Positive and Significant		
Regression 3: Overcharge estimates by application and CPT size	Not Statistically Significant	Not Statistically Significant	Positive and Significant	Positive and Significant

Notes: (1) Statistical significance was evaluated at the 10% level or lower (i.e., the overcharge regression coefficient must have a p-value of 0.1 or less to be considered to be statistically significant); (2) Results in boxes that cover multiple products indicate regressions for which the percentage overcharge was assumed to be equal across those products; (3) The CPT size categories are defined as follows: Small (0-19"), Medium (20-29"), Large (30+"); (4) Only results for the "Conspiracy 1" period identified by Dr. Leitzinger are summarized in this chart; (5) Estimated overcharges for the "Conspiracy 2" period identified by Dr. Leitzinger were not statistically significant for any of the specifications considered; (6) These regressions were estimated using the global CRT sales data used in Dr. Leitzinger's overcharge analysis (Figure 11, Leitzinger Report).

Exhibit 21B: Effect of Disaggregating Dr. Leitzinger's Overcharge Analysis of Global CRT Sales

	Combined Pre-Cartel and Post-Cartel Periods as Benchmark		Using Pre-Cartel Period as Benchmark		Using Post-Cartel Period as Benchmark	
	Conspiracy 1	Conspiracy 2	Conspiracy 1	Conspiracy 2	Conspiracy 1	Conspiracy 2
Regression 1: Estimate of average overcharge coefficient (CDTs and CPTs pooled)	0.0183** (0.0426)	0.00744 (0.596)	-0.0218* (0.0687)	-0.0471*** (0.00755)	0.0882*** (7.60e-08)	0.0619*** (0.000507)
<i>Observations</i>	2,960		2,900		2,841	
<i>R-squared</i>	0.985		0.985		0.985	
Regression 2: Estimates of separate overcharge coefficients for CPTs and CDTs:						
CDTs	0.000579 (0.977)	-0.0348 (0.260)				
CPTs	0.0225** (0.0240)	0.0177 (0.256)				
<i>Observations</i>	2,960					
<i>R-squared</i>	0.985					
Regression 3: Estimates of separate overcharge coefficients for CDTs and for CPTs of different sizes:						
CDTs	0.000672 (0.973)	-0.0351 (0.255)				
Small CPTs	-0.00713 (0.723)	0.0199 (0.493)				
Medium CPTs	0.0279** (0.0336)	0.0105 (0.618)				
Large CPTs	0.0427* (0.0509)	0.0197 (0.579)				
<i>Observations</i>	2,960					
<i>R-squared</i>	0.985					

Sources:

(1) Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LG, LPD, SDI, and Toshiba; (2) DisplaySearch Data; Bureau of Labor Statistics; OECD StatExtracts Database.

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**Exhibit 21B: Notes for Effect of Disaggregating Dr. Leitzinger's
Overcharge Analysis of Global CRT Sales**

Notes:

- (1) The dependent variable in these regressions is the log of the quantity-weighted average CRT price for a given manufacturer, application (CPT/CDT), size, and quarter, which is the same dependent variable used in the overcharge analysis presented in Figure 11 of Dr. Leitzinger's report;
- (2) The independent variables in these regressions are identical to the ones used in Dr. Leitzinger's overcharge analysis: (a) a one-quarter lagged dependent variable; (b) the one-quarter lagged log of the U.S. Producer Price Index for industrial glass and the one-quarter change in this index; (c) the one-quarter lagged log of CRT quantity (by manufacturer, application, and size) and one-quarter lagged change in the log of CRT quantity; (d) the one-quarter lagged log of global LCD shipments (by application) and the one-quarter lagged change in the log of global LCD shipments; (e) the quarterly growth rate of industrial production for G7 member countries; (f) the quarterly unemployment rate for G7 member countries; and (g) fixed effects by manufacturer, application, and size;
- (3) These regressions use the same data that Dr. Leitzinger used in his overcharge analysis;
- (4) The time periods in these regressions are defined in the same manner as in Dr. Leitzinger's overcharge analysis: (a) the pre-period is from Q3 1992 through Q1 1995, (b) the "Conspiracy 1" period is from Q2 1995 to Q2 2006, (c) the "Conspiracy 2" period is from Q3 2006 to Q1 2007, and the post-period is from Q2 2007 through Q4 2007;
- (5) P-values are reported in parentheses; "*" indicates significance at the 10% level; "***" indicates significance at the 5% level; "****" indicates significance at the 1% level. These p-values and significance levels pertain to the estimated coefficients on the conspiracy dummy variables used by Dr. Leitzinger. Very similar p-values are obtained by a Wald test of the long-run impact of the conspiracy-period dummies (i.e., conspiracy dummies that are not significant as per t-tests of short-run effects remain non-significant as per the Wald test, and conspiracy dummies that are significant as per t-tests of short-run effects remain significant as per the Wald test).

Exhibit 21C: Effect of Restricting Dr. Leitzinger's Overcharge Analysis to North American CRT Sales

	CDTs	CPTs		
		<u>SMALL</u>	<u>MEDIUM</u>	<u>LARGE</u>
Regression 1: Overcharge estimates for all CRTs	Not Statistically Significant			
Regression 2: Overcharge estimates by application (CDTs vs. CPTs)	Negative and Significant	Not Statistically Significant		
Regression 3: Overcharge estimates by application and CPT size	Negative and Significant	Not Statistically Significant	Not Statistically Significant	Not Statistically Significant

Notes: (1) Statistical significance was evaluated at the 10% level or lower (i.e., the overcharge regression coefficient must have a p-value of 0.1 or less to be considered to be statistically significant); (2) Results in boxes that cover multiple products indicate regressions for which the percentage overcharge was assumed to be equal across those products; (3) The CPT size categories are defined as follows: Small (0-19"), Medium (20-29"), Large (30+"); (4) Only results for the "Conspiracy 1" period identified by Dr. Leitzinger are summarized in this chart; (5) Estimated overcharges for the "Conspiracy 2" period identified by Dr. Leitzinger were not statistically significant for any of the specifications considered; (6) Regressions are estimated only on North American CRT sales data used in Dr. Leitzinger's overcharge analysis (Figure 11, Leitzinger Report).

Exhibit 21D: Effect of Restricting Dr. Leitzinger's Overcharge Analysis to North American CRT Sales

	Combined Pre-Cartel and Post-Cartel Periods as Benchmark		Using Pre-Cartel Period as Benchmark		Using Post-Cartel Period as Benchmark	
	Conspiracy 1	Conspiracy 2	Conspiracy 1	Conspiracy 2	Conspiracy 1	Conspiracy 2
Regression 1: Estimate of average overcharge coefficient (CDTs and CPTs pooled)	-0.0143 (0.155)	-0.00578 (0.756)	-0.0277** (0.0256)	-0.0281 (0.207)	0.0242 (0.265)	0.0234 (0.320)
<i>Observations</i> <i>R-squared</i>	1,327 0.991		1,303 0.99		1,232 0.99	
Regression 2: Estimates of separate overcharge coefficients for CPTs and CDTs:						
CDTs	-0.0769*** (0.00554)					
CPTs	-0.00647 (0.538)		0.000543 (0.977)			
<i>Observations</i> <i>R-squared</i>	1,327 0.991					
Regression 3: Estimates of separate overcharge coefficients for CDTs and for CPTs of different sizes:						
CDTs	-0.0774*** (0.00527)					
Small CPTs	-0.0197 (0.370)		0.0140 (0.693)			
Medium CPTs	0.00313 (0.817)		0.00551 (0.818)			
Large CPTs	-0.0201 (0.347)		-0.0359 (0.400)			
<i>Observations</i> <i>R-squared</i>	1,327 0.991					

Sources:

(1) Global CRT sales data for Chunghwa, Hitachi, MTPD, Panasonic, LG, LPD, SDI, and Toshiba; (2) Bureau of Labor Statistics; OECD StatExtracts Database; iSuppli Worldwide Monitor Market Tracker Database; iSuppli Television Systems Market Tracker Database.

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Exhibit 21D: Notes for Effect of Restricting Dr. Leitzinger's Overcharge Analysis to North American CRT Sales

Notes:

- (1) The dependent variable in these regressions is the log of the quantity-weighted average CRT price for a given manufacturer, application (CPT/CDT), size, and quarter, which is the same dependent variable used in the overcharge analysis presented in Figure 11 of Dr. Leitzinger's report;
- (2) The independent variables in these regressions are identical to the ones used in Dr. Leitzinger's overcharge analysis, except the global demand controls (G7 production growth rate and unemployment rate, LCD sales) used by Dr. Leitzinger are replaced with North-American or U.S. controls. Specifically, the independent variables are: (a) a one-quarter lagged dependent variable; (b) the one-quarter lagged log of the U.S. Producer Price Index for industrial glass and the one-quarter change in this index; (c) the one-quarter lagged log of CRT quantity (by manufacturer, application, and size) and one-quarter lagged change in the log of CRT quantity; (d) the one-quarter lagged log of North American LCD shipments (by application) and the one-quarter lagged change in the log of North American LCD shipments; (e) the quarterly growth rate of U.S. industrial production; (f) the quarterly U.S. unemployment rate; and (g) fixed effects by manufacturer, application, and size;
- (3) These regressions use a subset of the data that Dr. Leitzinger used in his overcharge analysis. Specifically, the data are limited to CRTs sold to North American customers that were identified using the "bill-to country" field (United States, Canada or Mexico). When the bill-to country field was not populated, the "ship-to country" field was used to identify sales to the United States, Canada or Mexico;
- (4) The time periods in these regressions are defined in the same manner as in Dr. Leitzinger's overcharge analysis: (a) the pre-period is from Q3 1992 through Q1 1995, (b) the "Conspiracy 1" period is from Q2 1995 to Q2 2006, (c) the "Conspiracy 2" period is from Q3 2006 to Q1 2007, and the post-period is from Q2 2007 through Q4 2007;
- (5) The data that Dr. Leitzinger used in his overcharge analysis do not include any North American CDT sales for the Conspiracy 2 period, and thus it was not feasible to estimate overcharges for North American CDT sales in the Conspiracy 2 period using these data;
- (6) P-values in parentheses; "*" indicates significance at the 10% level; "***" indicates significance at the 5% level; "****" indicates significance at the 1% level. These p-values and significance levels pertain to the estimated coefficients on the conspiracy dummy variables used by Dr. Leitzinger. Very similar p-values are obtained by a Wald test of the long-run impact of the conspiracy-period dummies (i.e., conspiracy dummies that are not significant as per t-tests of short-run effects remain non-significant as per the Wald test, and conspiracy dummies that are significant as per t-tests of short-run effects remain significant as per the Wald test).

EXHIBIT 39

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

IN RE: CATHODE RAY TUBE (CRT)
ANTITRUST LITIGATION

This document relates to:
ALL INDIRECT PURCHASER ACTIONS

Master File No. CV-07-5944-SC
MDL No. 1917

EXPERT SURREBUTTAL REPORT OF MARGARET E. GUERIN-CALVERT

November 06, 2014

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I. INTRODUCTION

A. Qualifications

1. I am a Senior Consultant at Compass Lexecon, a consulting firm that specializes in antitrust economics and applied microeconomics, and a founding director of its predecessor, Compass (Competition Policy Associates). My professional expertise, including my experience in testimony in the last four years at trial or deposition, is set out in detail in my curriculum vitae, which is attached as Appendix A. Compass Lexecon is being compensated for my work at my usual hourly rate of \$1,000. This compensation is in no way connected to the outcome of this litigation.

B. Overview and Assignment

2. Plaintiffs in this matter are indirect purchasers of finished products that contain cathode ray tubes (“CRTs”), such as televisions and computer monitors. Plaintiffs allege that the “Defendants conspired to fix, raise, maintain and/or stabilize prices of CRT Products sold in the United States. Because of Defendants’ unlawful conduct, Plaintiffs and other Class Members paid artificially inflated prices for CRT Products and have suffered antitrust injury to their business or property.”¹
3. The IPPs have retained Dr. Janet Netz to offer expert economic testimony related to their claims. I have been asked by counsel for several Defendants in this matter² to assess whether the economic analyses related to the impact of the alleged conspiracy among CDT manufacturers and the estimated overcharges on CDT sales provided by Dr. Janet Netz, provide a reliable and economically sound basis to estimate damages to the IPP class. Pursuant to this assignment, I filed an expert report on August 5, 2014 (“Guerin-Calvert Report” or “my initial report”)³ and I was deposed on September 17, 2014.
4. Subsequent to that time, Dr. Netz has filed a rebuttal report with opinions related to alleged CDT damages (“Netz Merits Rebuttal Report”).⁴ Counsel for Defendants have asked me to review and respond to the

¹ Indirect Purchaser Plaintiffs’ Fourth Consolidated Amended Complaint, In re: Cathode Ray Tube (CRT) Antitrust Litigation, January 10, 2013 (United States District Court Northern District of California San Francisco) – (hereafter “IPP Complaint”), at ¶1.

² I have been retained by Winston & Strawn LLP and Weil, Gotshal & Manges, LLP representing Panasonic Corporation of North America, MT Picture Display Co., Ltd., and Panasonic Corporation (f/k/a Matsushita Electric Industrial Co.); Kirkland & Ellis LLP representing Hitachi, Ltd., Hitachi Asia, Ltd., Hitachi America, Ltd., Hitachi Electronic Devices (USA), Inc., and Hitachi Displays, Ltd. (n/k/a Japan Display Inc.) (collectively, the “Hitachi Defendants” or “Hitachi”); White & Case LLP representing Toshiba America Consumer Products, L.L.C., Toshiba America Electronic Components, Inc., Toshiba America, Inc., Toshiba America Information Systems, Inc., and Toshiba Corporation; Sheppard, Mullin, Richter & Hampton LLP representing Samsung SDI America, Inc., Samsung SDI Co. Ltd., Samsung SDI (Malaysia) Sdn. Bhd., Samsung SDI Mexico S.A. De C.V., Samsung SDI Brasil Ltda., Shenzhen Samsung SDI Co., Ltd., and Tianjin Samsung SDI Co., Ltd.; and Baker Botts LLP representing Koninklijke Philips N.V., Philips Electronics North America Corporation, Philips Taiwan Limited, and Philips do Brasil Ltda.

³ Expert Report of Margaret Guerin-Calvert, August 5, 2014 (hereafter “Guerin-Calvert Report”).

⁴ Expert Rebuttal Report of Janet Netz, September 26, 2014 (hereafter “Netz Merits Rebuttal Report”).

opinions and analyses contained in Dr. Netz's Merits Rebuttal Report with respect to issues relevant for estimating alleged impact and damages on CDTs.

5. An updated list of the materials I have relied upon in reaching my opinions is attached as Appendix B.
6. My analysis is ongoing and I reserve the right to evaluate any new reports or analysis produced by Plaintiffs or their experts as well as to incorporate new information into my analysis and opinions as necessary.

C. Summary of Conclusions

7. In my initial report, I demonstrated that the results of Dr. Netz's overcharge model rely heavily on price increases in 1995 and the resulting high prices in 1995 and 1996 which are not plausibly related to the alleged conspiracy. Dr. Netz's overcharge model is extremely sensitive to the manner in which the indicator variables (dummy variables) for the alleged cartel period are specified. In particular, I demonstrated that Dr. Netz's assumption that the alleged conspiracy resulted in an equal percentage overcharge of 22 percent throughout the entire 12 year period of 1995 through 2006 was inconsistent with: a) CDT industry conditions; b) Dr. Netz's own allegations regarding the alleged conspiracy; and c) econometric analysis of CDT prices.
8. In her rebuttal report and commentary on my economic analyses, Dr. Netz argues that I "overlook the documentary and testimonial evidence related to cartel conduct and *effectiveness* in 1995 and 1996." (Emphasis added.)⁵ In fact, I have fully considered the documentary and testimonial evidence of collusion offered by Dr. Netz, as well as my own, additional extensive review of the factual and economic evidence for 1995 and 1996 in my assessment of her model and overcharge analysis. I have used my analysis for the purpose of making and supporting the economically appropriate and reasonable changes to her model, and presenting alternative overcharge estimates from that for 1995 and 1996 (along with other years). Dr. Netz and I agree that cartel efficacy is an empirical question.⁶ Contrary to Dr. Netz's claims, the fundamental question is not whether a given model generates overcharge estimates for 1995 and 1996. Dr. Netz's model and the economically reasonable and appropriate changes I made to her model to better account for underlying market conditions and facts both result in estimated overcharges during these years. Rather, the fundamental question is what the most appropriate way is to model and estimate the magnitude of overcharges, if any, in light of the available factual and empirical evidence.
9. I believe that the relatively few adjustments I made to Dr. Netz's overcharge model are strongly supported by the underlying economic and factual circumstances in 1995 and 1996 (and indeed in other years) and also by recognized econometric practice. There are at least three separate and widely recognized rationales for the use of multiple dummy variables to estimate cartel overcharges that apply in this matter, and none are diminished by Dr. Netz's reference to any additional documentary and testimony evidence from 1995 and 1996: 1) if the effectiveness of the conspiracy varied over time, 2) if there are important

⁵ Netz Merits Rebuttal Report, p. 5.

⁶ See, e.g., Guerin-Calvert Report, pp. 8-9.

changes in economic conditions affecting prices that are not otherwise captured in the model, and c) if class membership varies over time. The change to include dummy variables for 1995 and 1996 and the other changes better to account for industry conditions and facts that varied over time continue to be economically necessary to produce more economically reasonable approaches to estimate overcharges than those provided by Dr. Netz's model.

10. Dr. Netz argues in her rebuttal report that her overcharge model is "robust to small changes in the model." However, while her estimated overcharges may not change substantially with certain handpicked changes in the model that she herself chose to highlight, they clearly are not robust to other economically reasonable small changes. In fact, as I demonstrated in my initial report, when I relaxed Dr. Netz's arbitrary assumption that overcharges were constant during 1995 through 2006 and allowed the estimated effect to vary over time, the results were dramatically inconsistent with her "robustness" assumption:
 - The estimated overall overcharge declines substantially.
 - A large portion of the remaining "overcharge" occurs only in years 1995 and 1996.
 - The overcharge for the great majority of the alleged conspiracy period 1997-2007 is small and not statistically significant.
 - The ability of the model to explain overall changes in CDT prices over time improves significantly.
11. The unreliability of Dr. Netz's overcharge model for estimating damages across the class and across the class period is further demonstrated in this report by the fact that the estimated overcharges for the larger sizes (over 15") of CDTs completely disappear if we simply estimate Dr. Netz's overcharge model separately for different sizes of CDTs. Moreover, this category of larger size CDTs accounts for roughly 65 percent of total CDT sales during the alleged cartel period in Dr. Netz's data.
12. The fact that the overcharge on such a large category of sales disappears with such a reasonable change in the model – splitting the data into two size categories and estimating Dr. Netz's own model separately for each -- further undermines her claim that her estimated overcharges are robust to reasonable changes. It also casts substantial doubt on the proposition that the alleged conspiracy would produce common impact and/or similar overcharges for all sizes of CDTs because there was a reliable and commonly understood "price structure" between and among sizes, for example.
13. Dr. Netz does not assert that any of the variables I added to her model lack economic relevance or are in and of themselves inappropriate. Instead, Dr. Netz argues in her rebuttal report that the additional variables that I added to her model "do not explain materially more of CRT price changes than the variables I [Dr. Netz] use."⁷ In contrast, I show in this report that the variables that I added substantially improve the performance of her model based both on economic logic and on widely recognized econometric criteria, as well as substantially reducing overcharges.
14. In my initial report, I used financial information from several defendants to make two primary points: 1) Defendants' profit margins showed no significant increase at the beginning of the alleged conspiracy

⁷ Netz Merits Rebuttal Report, p. 5.

despite Dr. Netz's claim that prices were effectively increased substantially and anticompetitively at that point in time; and 2) Dr. Netz's estimated overcharges imply that most defendants would have incurred substantially lower profitability in the but-for world than they experienced in the actual world, including large losses for an extended period of time. In this report I demonstrate that these conclusions are not affected by the criticisms made by Dr. Netz in her rebuttal report.

15. I also explain that such losses likely would have led some of the defendants to reduce the level of investment below what they had invested in the actual world, and in some cases may have caused firms to exit the industry earlier than they did in the actual world. Dr. Netz failed to consider any of these potential consequences of her large assumed overcharges on manufacturer incentives in her expert report filed on April 15, 2015 ("Netz Merits Report")⁸. Similarly, her attempts to dismiss them in her rebuttal report are not convincing.
16. In her rebuttal report, Dr. Netz made a number of other criticisms of my initial report. I respond to these arguments in this report. As described in more detail below, none of the additional arguments or analyses offered by Dr. Netz have caused me to change my opinions.

II. DR. NETZ'S CRITICISMS OF MY ECONOMIC ASSESSMENT OF OVERCHARGES AND DR. NETZ'S MODEL ARE INCORRECT.

A. Dr. Netz's overcharge estimates rely heavily on price increases in 1995 which are not plausibly related to the alleged conspiracy.

17. In my initial report, I demonstrated that Dr. Netz's overcharge model is extremely sensitive to the manner in which the indicator variables for the alleged cartel period are specified. In particular, I demonstrated that Dr. Netz's assumption that the alleged conspiracy resulted in an equal percentage overcharge of 22 percent throughout the entire 12 year period of 1995 through 2006 was inconsistent with: a) industry conditions; b) Dr. Netz's own allegations regarding the alleged conspiracy; and c) econometric analysis of CDT prices.
18. In her rebuttal report Dr. Netz makes a number of responses to my analysis. For example, she argues that "Case evidence supports cartel overcharges throughout 1995-2007, including 1995 and 1996. Ms. Guerin-Calvert and Prof. Willig overlook the documentary and testimonial evidence related to cartel conduct and effectiveness in 1995 and 1996."⁹

⁸ Expert Report of Janet S. Netz, Ph.D, April 15, 2014 (hereafter "Netz Merits Report").

⁹ Netz Merits Rebuttal Report, p. 5.

19. Dr. Netz argues that I “overlook the documentary and testimonial evidence related to cartel conduct and *effectiveness* in 1995 and 1996.”(Emphasis added.)¹⁰ In fact, I have fully considered the documentary and testimonial evidence of collusion offered by Dr. Netz, along with additional extensive review of the factual and economic evidence for 1995 and 1996 in my assessment of her model and overcharge analysis – and in making and supporting the economically appropriate and reasonable changes to her model, and presenting alternative overcharge estimates from that for 1995 and 1996 (along with other years). I took into account this evidence not only from 1995 and 1996, but also from the entire period as well and conducted and reported extensively on industry conditions and other factors. Dr. Netz appears to suggest that one can infer efficacy of the alleged conspiracy from documents and testimony, although I noted in my initial report that Dr. Netz and I were in agreement that efficacy is an empirical question.¹¹ Contrary to Dr. Netz’s claims, the issue is not whether a given model generates overcharge estimates for any specific year, including for 1995 and 1996. Dr. Netz’s model and the economically reasonable and appropriate changes I made to her model better to account for underlying market conditions and facts, both result in estimated overcharges during these years. Rather, the fundamental question is what the most appropriate way is to estimate the magnitude of overcharges, if any, in light of the available factual and empirical evidence. There is no inconsistency between making the relatively few adjustments I made to Dr. Netz’s overcharge model to reflect market and industry conditions in 1995 and 1996 (and throughout the period) and to adapt the model expressly to account for potential differences between those years and other years, as the evidence suggests is the case.

20. These changes are strongly supported by the underlying economic and factual circumstances in 1995 and 1996 (and indeed in other years) and also by recognized econometric practice. They continue to be economically necessary to produce more economically reasonable approaches to estimate overcharges. There can be no dispute about the general proposition that it is appropriate in certain circumstances to use multiple dummy variables to reflect the fact that the overcharge differs during certain portions of the entire alleged conspiracy period. In fact, Dr. Netz herself uses a separate dummy variable for the year 2007 because she believes that the overcharge may have been lower during 2007 than during 1995-2006 because of the actions taken by certain governmental antitrust agencies at that time. This methodology is widely accepted in economics.¹² For example, one source provides additional insight into the conditions under which the use of multiple dummy variables are appropriate:

- “If more than one dummy variable is used, their values may be established to distinguish different subperiods within the conspiracy period. This may provide a more accurate estimate of overcharges if the effectiveness of the conspiracy varied over time or if there would have been important changes in the economic conditions affecting prices in the but-for world that could not otherwise be captured by the model. In class action cases where class membership varies over time, estimating an overcharge for various subperiods may lead to a more accurate estimate of

¹⁰ Netz Merits Rebuttal Report, p. 5.

¹¹ Guerin-Calvert Report, pp. 8-9.

¹² Such variation is more likely to occur when the alleged conspiracy period covers many years with substantially different market conditions.

overcharges for specific class members than would an estimate of the average overcharge over the entire relevant time period.”¹³

21. This passage provides *three separate rationales* for the use of multiple dummy variables to estimate cartel overcharges: 1) if the effectiveness of the conspiracy varied over time, 2) if there are important changes in economic conditions affecting prices that are not otherwise captured in the model, and c) if class membership varies over time. In fact, all three of these rationales strongly support the use of multiple dummy variables in this case.
22. As I explained in my initial report, there were several considerations that led me to make a few but particularly important changes to Dr. Netz’s model to re-estimate overcharges using a modified version of her regression model that explicitly allows for changes over time in the estimated effect of the alleged conspiracy. First, several factors that were unrelated to the alleged conspiracy led to significant CDT price increases in 1995 which persisted into 1996.¹⁴ The factors included rapid growth in demand for computer monitors and CDTs, increased demand for larger monitors due to the introduction of Windows 95 and other factors; CDT capacity shortages due to demand expanding more rapidly than supply and transitions to larger CDTs; glass shortages and other factors. These factors were widely recognized at the time and discussed in contemporaneous documents.¹⁵ Dr. Netz offers little or no evidence in her rebuttal report to dispute that these factors significantly impacted CDT prices during this period.
23. Second, I noted that Dr. Netz’s own summaries of evidence regarding the alleged conspiracy implied that the extent of alleged collusive activity, and the likely economic effects of any such activity, were substantially less in 1995 and 1996 than in later years. To cite the most obvious examples, Dr. Netz’s target price database has no target prices for 1995, and substantially fewer in 1996 than in later years. Similarly, the first example of alleged conspiracy meetings regarding alleged restrictions in output or capacity that Dr. Netz identified did not occur until November of 1996. In her rebuttal report, Dr. Netz seeks to augment the evidence regarding 1995 and 1996 with a number of additional documents. However, she does not appear to claim that any of these additional documents contained alleged agreements on target prices or alleged output restrictions. Moreover, none of her cited documents contradicts or undermines the fundamental economic conditions in 1995 and 1996 that differentiate those

¹³ ABA Section of Antitrust Law, “Proving Antitrust Damages: Legal and Economic Issues,” (2D ED. 2010), at 204, footnote 23.

¹⁴ Dr. Netz states that I “claim the glass shortages in 1995 and 1996 are the explanation for their high estimated overcharges in those years relative to later years.” See Netz Merits Rebuttal Report, p. 58. However, she ignores the other, more important, factors that I described at length in my report such as growth in demand for computer monitors and CDTs, increased demand for larger monitors due to the introduction of Windows 95 and other factors; CDT capacity shortages due to demand expanding more rapidly than supply and transitions to larger CDT sizes and other factors. See, e.g., Guerin-Calvert Report, section III.A.

¹⁵ See, e.g., Guerin-Calvert Report, section III.A.

years from later periods, including rapidly increasing demand, significant changes in demand and capacity, capacity shortages and mis-matches in demand and supply.¹⁶

24. Modification to Dr. Netz's model to allow the effect of the alleged conspiracy on price to vary over time, shows that this revised version of her model results in very low estimated overcharges in the periods in which she alleges the manufacturers were engaged in more frequent use of target prices and other allegedly collusive conduct, and in higher overcharges during the period where there was little such activity. Rather than accepting that the higher estimated "overcharges" for 1995 or 1996 as compared to those for 1997-2006 is likely due to factors other than alleged conspiracy, Dr. Netz apparently is willing to attribute such implausible price elevation to the alleged conspiracy. (In Table 8 of my initial report, the estimated overcharge from allegedly elevated CDT prices in 1995 is 16.1 percent as compared to a 1.6 percent estimated overcharge for 1997 through 2006. For 1996 the estimated price elevation is 23.5 percent compared to the 1.6 percent for 1997 through 2006.) Accordingly, Dr. Netz's analysis does not imply that the alleged conspiracy was equally effective in 1995 – 1996 as in later years; it effectively assumes that the alleged conspiracy was far more effective in these early years. I find this completely implausible.
25. Moreover, there are a number of other economic reasons in addition to those discussed above why the alleged conspiracy would have been less effective in 1995 – 96, not more effective, as Dr. Netz's analysis implies. For example, the degree of supplier concentration in the CDT industry generally was quite low in the early years of the alleged conspiracy.¹⁷ In addition, the diversity of business strategies being followed by the manufacturers likely was greater in the earlier years. Both of these factors would have increased even more the difficulty of collusion in these early years.¹⁸ Similarly, Dr. Netz repeatedly emphasizes the importance for her opinions of the organizational structure of the alleged conspiracy as well as the use of target prices.¹⁹ However, this alleged structure and organization were far less evident during 1995 and 1996 than Dr. Netz alleges it was in later years.²⁰
26. As I explained in my initial report, there is strong support for the proposition that the effectiveness of the conspiracy alleged by plaintiffs and Dr. Netz would have varied significantly over time. In particular, an economic analysis of the evidence of alleged collusive conduct that Dr. Netz and the plaintiffs have offered indicates that such alleged conduct was substantially less prevalent in 1995 and 1996 than in 1997 – 2006. Dr. Netz has emphasized that the primary mechanisms of the alleged conspiracy included: a) the

¹⁶ Dr. Netz also speculates that the factual record with respect to target prices may be incomplete for various reasons. See Netz Merits Rebuttal Report, p. 8. However, even if this were true, it would not eliminate the strong economic and factual bases for analyzing whether the effect of the alleged conspiracy varied over time.

¹⁷ See, e.g., Guerin-Calvert Report, ¶38, Figure 9. Calculation of CDT shares and HHIs are provided in my Guerin-Calvert Report backup file "a003_pdn_mfg_shares.xlsx".

¹⁸ As I discussed in my initial report, low industry concentration and asymmetries among the alleged conspirators are both factors that increase the difficulty of collusion.

¹⁹ Netz Merits Rebuttal Report, section VIII.A.3.

²⁰ The literature Dr. Netz cites is consistent with fact that organization of cartels can take time. For example, Netz Merits Rebuttal Report, pp. 38-39 citing Levenstein, Margaret C. and Valerie Y. Suslow, 2006, What Determines Cartel Success?, Journal of Economic Literature, Vol. XLIV, 43-95, at p. 44.

use of target prices to align expectations and coordinate pricing decisions; b) the imposition of restrictions on output and capacity; c) the establishment of monitoring and enforcement procedures; d) the allocation of customers and market shares to suppliers.²¹ However, she provides very few (and in many cases zero) alleged examples of these types of conduct in 1995 or 1996.

27. In addition, there is substantial evidence from contemporaneous documents that “there would have been important changes in the economic conditions affecting prices in the but-for world that could not otherwise be captured by the model.”²² As I explained in my initial report, several factors that were unrelated to the alleged conspiracy including rapid growth in demand for computer monitors and CDTs, increased demand for larger monitors due to the introduction of Windows 95 and other factors; CDT capacity shortages due to demand expanding more rapidly than supply and the transition to larger CDT sizes; glass shortages and other factors led to significant CDT price increases in 1995 which persisted into 1996.²³ These factors were widely recognized at the time and widely discussed in contemporaneous documents.²⁴ I also demonstrated that these factors were not adequately controlled for in Dr. Netz's econometric model of overcharges.²⁵
28. While there is strong evidence that all or most of the “price elevation” in 1995 and 1996 was not caused by the alleged conspiracy, it is important to recognize that my conclusion that Dr. Netz greatly overstated any possible overcharge is not dependent upon this opinion. Even if I were inappropriately to attribute a large portion of the estimated effect from the 1995 and 1996 coefficients to the alleged conspiracy in calculating estimated damages, the estimated damages would still be far less than the amount estimated by Dr. Netz. For example, I reported in paragraph 121 of my first report that using model (2) in Table 6 of my first report which only adjusted Dr. Netz's model to add the additional dummy variables for 1995 and 1996 and incorrectly assuming (for sake of illustration) that 100 percent of the estimated “overcharge” in 1995 and 1996 was due to the alleged conspiracy, the weighted average overcharge for the 1995 through 2007 time period still declines from the 22 percent reported by Dr. Netz to only 4.29 percent.²⁶ This occurs because when I eliminate Dr. Netz's artificial restriction and allow the overcharge

²¹ Netz Merits Rebuttal Report, section VIII.A.3.

²² ABA Section of Antitrust Law, “Proving Antitrust Damages: Legal and Economic Issues,” (2D ED. 2010), at 204 footnote 23.

²³ Dr. Netz states that I “claim the glass shortages in 1995 and 1996 are the explanation for their high estimated overcharges in those years relative to later years.” See Netz Merits Rebuttal Report, p. 58. However, she completely ignores the other, more important, factors that I described at length in my report such as growth in demand for computer monitors and CDTs, increased demand for larger monitors due to the introduction of Windows 95 and other factors; CDT capacity shortages due to demand expanding more rapidly than supply and transitions to larger size CDTs and other factors. See, e.g., Guerin-Calvert Report, section III.A.

²⁴ Guerin-Calvert Report, section III.A.

²⁵ Guerin-Calvert Report, pp. 72-81.

²⁶ See my Guerin-Calvert Report backup file “weighted_average_overcharge.csv”. Similarly, incorporating the additional adjustments I made to Dr. Netz's model in my initial report (column 3 of Table 8 in my initial report) and incorrectly assuming (for sake of illustration) that 100 percent of the estimated “overcharge” in 1995 and 1996 was due to the alleged conspiracy, the weighted average overcharge for the 1995 through 2007 time period declines from the 22 percent reported by Dr. Netz to only 6.35 percent. Similarly, if I assume 50% of the estimated “overcharge” in 1995 and 1996 was due to the alleged conspiracy, the weighted average overcharge would decline to 3.75 percent. See my backup file “OC Values Under

to vary during 1995 and 1996, the coefficients on the other variables in the model change and the model is able to do a better job of explaining the overall movements in CDT prices over time.

29. The fact that the indicator variables for 1995 and 1996 are highly statistically significant and also lead to a substantial reduction in Dr. Netz's estimated overcharges, provides strong evidence that Dr. Netz's model is mis-specified. An American Bar Association (ABA) treatise on estimating antitrust damages states that:

“For this approach [the dummy variable approach] to yield reliable estimates of the overcharge, the model must include all factors that are likely to affect price. Otherwise the parameter estimate on the conspiracy indicator variable may be confounded with other explanatory variables omitted from the model. A model that failed to include the price of a key input, for example, may inappropriately attribute the impact of changing costs conditions to the conspiracy indicator variable and thus generate biased estimates of the true effect of the conspiracy.”²⁷

30. In the context of Dr. Netz's overcharge model, the omission of the dummy variables for 1995 and 1996, (as well as other relevant variables such as shipping costs, desktop shipments, exchange rates and labor costs) and the substantial reduction in the overcharge estimate when such variables are added to Dr. Netz's analysis, provide strong evidence that her estimates of overcharges are biased and unreliable.
31. Another factor that likely would have caused the effectiveness of the alleged conspiracy to vary over time was the increased penetration of LCDs. As I described in my first report, competition from LCDs was a significant additional constraint on CRT pricing, which increased substantially over time.²⁸ In her recent deposition, Dr. Netz acknowledged that the impact of the alleged conspiracy on CRT prices could have varied during the alleged cartel period due to the increase in LCD competition over time.²⁹ Dr. Netz also acknowledged that she has not provided any empirical analysis to determine how the impact of the alleged cartel may have varied across the 1995-2006 period.³⁰

Varying Assumptions.xlsx”. Note that I treat any negative estimated overcharges as zero in calculating weighted average overcharges.

²⁷ ABA Section of Antitrust Law, *Econometrics: Legal, Practical, and Technical Issues*, Second Edition, 2014, p. 104. See also ABA Section of Antitrust Law, “Proving Antitrust Damages: Legal and Economic Issues,” (2D ED. 2010), p.154, 177.

²⁸ Guerin-Calvert Report, p. 6, 11. See also LPD-NL00173522 – LPD-NL00173655, at 3585.

²⁹ Deposition of Dr. Janet Netz, October 31, 2014 (hereafter “Netz Merits Rebuttal Deposition”), pp. 26-27; 35-36. Dr. Netz acknowledged that LCD competition constrained the ability of the alleged cartel to raise CRT prices. See Netz Merits Rebuttal Deposition, p. 37, and Netz Merits Rebuttal Report, footnote 3. See also CHU00660408–18 at 17; SDCRT-0090328–38 at 34; CH000031268E–9E at 9E; SDCRT-0002805E–60E at 40E; CHU00031051.01E–5E at 2.02E.

³⁰ Netz Merits Rebuttal Deposition, p. 27. Dr. Netz argued that data limitations prevented her from allowing the effect of the alleged conspiracy to vary over time. Netz Merits Rebuttal Deposition, pp. 27, 31. In contrast, I believe the data is sufficient. This is supported by the fact that my estimates of the coefficients on the dummy variables for 1995 and 1996 are highly statistically significant and are statistically different from the coefficients for later years with very high levels of statistical confidence. See my Guerin-Calvert Report backup file “Summary of CDT Overcharge Models.xlsx” and my backup file “Summary of CDT Overcharge Models_log_testparm.log”.

B. Dr. Netz's overcharge model is not robust or reliable.

32. Dr. Netz also argues in her rebuttal report that her overcharge model is “robust to small changes in the model, contrary to Defendants’ experts’ claim.”³¹ She attempts to support this claim by pointing to a number of sensitivity analyses that she reported in her merits report. However, while her results may be robust to the handpicked changes that she herself chose to highlight in her report, they clearly are not robust to other economically reasonable small changes such as the use of more appropriate conspiracy dummies. In fact, as I demonstrated in my initial report, when I relaxed Dr. Netz's arbitrary assumption that overcharges were constant during 1995 through 2006 and allowed the estimated effect to vary over time the results were dramatically inconsistent with her assumption:
- The estimated overall overcharge declines substantially.
 - A large portion of the remaining “overcharge” occurs only in years 1995 and 1996.
 - The overcharge for the great majority of the alleged conspiracy period 1997-2007 is small and not statistically significant.
 - The ability of the model to explain changes in CDT prices over time improves significantly.
33. The unreliability of Dr. Netz's overcharge model is further demonstrated by the fact that it produces substantially different estimates of overcharges than those reported by Dr. Netz if we re-estimate her model separately for different sizes of CDTs. For example, Table 1 summarizes the results of estimating Dr. Netz's overcharge model after separating her data set into two groups by size of CDT: CDTs which are less than or equal to 15 inches, and CDTs which are greater than 15 inches. For the group with the smaller CDTs, the estimated “overcharge” for Dr. Netz's 1995 – 2006 time period is 21.3 percent, a figure similar to the 22 percent overcharge that Dr. Netz reported for the entire sample. However, the estimated “overcharge” for the larger size over 15” CDTs completely disappears. The point estimate is negative at 16.5 percent, and is not statistically significant. Accordingly, if we make no changes to Dr. Netz's model other than simply splitting the sample into large and small CDTs, the overcharges on the large CDT category completely disappear.³² Moreover, this category of large size CDTs accounts for a very substantial percentage of the total sales volume. According to Dr. Netz's sales data, CDTs with sizes greater than 15 inches account for roughly 65 percent of total CDT sales during the alleged cartel period in the data set.³³ Table 1 also shows that if we take a weighted average of the estimated overcharges for the large and small CDT categories the resulting overcharge is 7.4 percent as compared to Dr. Netz’s reported overcharge of 22 percent for the 1995-2006 period.
34. Table 1 also shows the results of some additional modifications to estimating Dr. Netz's overcharge model by size category. In rows three and four of the table, we have added the four additional control variables that I discussed in my initial report to Dr. Netz’s model for each size group. While the large CDT category continues to have no estimated overcharges, the small CDT estimate drops from the 21.3 percent

³¹ Netz Merits Rebuttal Report, p. 5.

³² While Dr. Netz may claim that splitting the sample results in sample sizes that are too small (see, e.g., Netz Merits Rebuttal Report, p. 59, 63), I note that the coefficient on the 1995-2006 variable in the small CDT regression is statistically significant and that the large CDT sample size is very similar to the small CDT sample size (580 and 534 observations, respectively). See backup file “CDTs (Large vs Small).xlsx”.

³³ See my backup file “Large CDT Sales as % of Total CDT Sales.xlsx”.

in row (b) to 8.9 percent in row (c), and the weighted average overcharge for 1995 to 2006 drops from 7.4 percent to 3.1 percent.³⁴ Lastly, in row (d) of the table, I have also added the additional dummy variables to allow the estimated “overcharge” variables to be different in 1995 and 1996 from the rest of the alleged conspiracy period. The result is to reduce the weighted average CDT overcharge from 3.1 percent to 1.6 percent even if we assume (for sake of illustration) that 100 percent of the 1995 and 1996 coefficients represent an “overcharge.”³⁵ If instead, I follow the methodology I used in my initial report and use the 1997 – 2006 coefficient for 1995 and 1996 as well, there would be zero overcharges since the estimated coefficient on the 1997 – 2006 variable is negative.

Table 1³⁶

The Estimated “Overcharges” Produced by Dr. Netz's Model Are Substantially Different for Different Sizes of CDTs

Specification:		Large CDT Overcharges (>15 inches)		Small CDT Overcharges (≤15 inches)		Overall Average CDT Overcharges (Zero-Out Negative Overcharges)		
		1995-2006	2007	1995-2006	2007	1995-2006	Using 97-06 OC for 95/6	2007
(a)	Dr. Netz's Model of Overcharges	N/A	N/A	N/A	N/A	22.0%	NA	11.4%
(b)	Dr. Netz's Model of Overcharges - by Size	-16.5%	-16.5%*	21.3%***	2.7%	7.4%	NA	0.4%
(c)	Netz Model - by Size and with Additional Cost and Demand Controls Variables (Guerin-Calvert Initial Damages Report)	-6.1%	-8.9%	8.9%	-12.5%	3.1%	NA	0.0%
(d)	Netz Model - by Size and with Additional Cost, Demand & Conspiracy Dummy Variables	0.0%	-8.6%	4.6%	-17.6%**	1.6%	0.0%	0.0%

Notes: (i) “***” indicates statistical significance at 1%; “**” at 5%; “*” at 10%; (ii) the overcharge relative to the actual price is calculated by first converting the regression coefficient to percent terms using the formula: $c = \exp(b - 0.5 V(b)) - 1$, where b is the coefficient on the cartel dummy and $V(b)$ is the variance of b . The overcharge as a percent of actual price is then calculated as $1 - 1/(1+c)$; (iii) the weighted average overcharge is calculated using the relevant sales shares of large and small CPTs in Dr. Netz's estimation data (estimation_size.dta); (iv) In the last three columns and throughout the last row of the table, whenever a size-specific overcharge is negative, it is zeroed out in calculations of weighted average overcharges; (v) the following additional control variables were used in row (c): Korean labor cost index, USD-Korean Won exchange rate, Baltic Dry shipping index, and worldwide desktop shipments; (vi) in row (d), all additional variables from row (c) were included in the regression and the two cartel dummies used by Dr. Netz were replaced with four cartel dummies: separate dummies for 1995 and 1996, another dummy for 1997-2006, and a dummy for 2007; (vii) Large CDTs are defined as CDTs that are more than 15 inches in actual diagonal length.

Sources: (1) Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba; (2) Bloomberg L.P., OECD StatExtracts Database, U.S. Census Bureau, Federal Reserve Bank of St. Louis, International Monetary Fund.

35. In addition to substantially reducing the estimated overcharges, standard statistical tests show that breaking up the sample into large and small CDTs meets statistical criteria indicating that the model fits the data better when estimated separately for the different size categories. I performed a statistical test of whether or not the coefficients as a group in the large size model are statistically significantly different than the coefficients in the small size model.³⁷ The statistical test rejects the hypothesis that the coefficients are equal at a very high level of statistical significance.

³⁴ A more detailed summary table for the regressions in Table 1 can be found in Appendix C, Table 1A. In the regression reported in row (c) of Table 1, the Baltic Dry shipping index variable was not statistically significant. As shown in row seven of Appendix C Table 1A, the weighted average overcharge remains at 3.1% even if I drop this variable.

³⁵ In the regression reported in row (d), the Korean labor cost index variable was not statistically significant. As shown in row eight of Appendix C, Table 1A, the weighted average overcharge increases slightly from 1.6 percent to 1.8 percent if I drop this variable.

³⁶ See my backup file “CDT OC Summary 2.xlsx”.

³⁷ This statistical test is a widely recognized test known as a “Chow” test. Specifically, the test is performed by interacting all of the explanatory variables in the model with a variable that equals 1 for large CDT observations and estimating the regression model with the addition of the large size interactions. If there is no difference between the model for small and

36. The foregoing empirical evidence is fully consistent with other economic evidence that the conditions associated with the effectiveness of the alleged conspiracy could vary by factors related directly or indirectly to the size of CDTs. For example, the identities of the manufacturers varied significantly by size of CDT. As I noted in my initial report, Japanese-based manufacturers held substantially greater shares of the larger sizes of CDT, particularly during the early years of the alleged conspiracy (although they also made smaller size CDTs), and the period is marked by significant share changes and low concentration.³⁸ According to Dr. Netz's own data, the Japanese-based manufacturers attended a substantially lower fraction of the supposed cartel meetings identified by Dr. Netz³⁹ and rarely appear in Dr. Netz's alleged examples of output and capacity restrictions.⁴⁰ Similarly, Dr. Netz recognizes that Japanese-based manufacturers may have followed different business strategies from those of other defendants.⁴¹ In addition, the dynamics of supply and demand forces were in many cases substantially different across different sizes of CDTs. For example, Figure 14 of my initial report showed that growth rates of demand were much higher for the larger sizes of CDTs than those of smaller CDTs, particularly during the early part of the alleged conspiracy. Such differences likely could have required different types of coordination for these larger sizes of CDTs where demand and capacity were growing much more rapidly, and overall could lead to varying incentives and difficulty in achieving effective coordination on price or capacity, as alleged. These differences in supply and demand factors also led to substantially different price behavior over time as shown by my hedonic regressions and other analysis.⁴²
37. The substantial differences in the estimated overcharges between small and large CDTs from Dr. Netz's model and modifications to it bears directly on several of the arguments that Dr. Netz made in her rebuttal report.
- a. First, it further undermines her claim that her estimated overcharges are robust to reasonable changes and sensitivity analyses.⁴³ Given the differences in manufacturer shares and supply and demand factors across sizes and the changing price premiums across sizes, it is plausible and reasonable to test Dr. Netz's model to examine whether it indeed produces similar overcharges for different sizes of CDTs. The answer clearly is "no."
 - b. Second, it further supports the point I made in my initial report and above that Dr. Netz's overcharge estimates rely very heavily on assuming that there is a *common* effect of the alleged conspiracy across the entire period of 1995-2006,⁴⁴ and that this is clearly not the case for the

large CDTs, one should not reject the hypothesis that the coefficients on all of the interaction terms are jointly zero at conventional levels. However, I find that the hypothesis is strongly rejected (the test p-value is less than 0.1 percent). See my backup file "Large vs Small CDT Chow Test.xlsx".

³⁸ See, e.g., Guerin-Calvert Report, ¶¶39-41.

³⁹ See, e.g., Netz Merits Report, Exhibit 27.

⁴⁰ See, e.g., Netz Merits Report, Exhibit 28.

⁴¹ See, e.g., Netz Merits Rebuttal Report, pp. 50-51. See also Netz Merits Rebuttal Deposition, pp. 69-70.

⁴² See, e.g., Guerin-Calvert Report, ¶84 and figures 13 and 15-18.

⁴³ Netz Merits Rebuttal Report, p. 5.

⁴⁴ For Dr. Netz's responses, see, e.g., Netz Merits Rebuttal Report, pp. 57-60.

period in which the majority of sales of >15 inch CDTs are sold as compared to the earlier period. In fact, the difference between 1995-1996 and the later period suggests that Dr. Netz's model is not capturing all of the economic factors that are likely driving price in the earlier period.⁴⁵

- c. Third, it casts further doubt on Dr. Netz's claims that the alleged conspiracy would not need to set prices for all sizes of CDTs in each quarter because there was a commonly understood "price structure" that would determine the prices and overcharges of any products for which the alleged conspirators did not explicitly set target prices.⁴⁶ As described below, Dr. Netz's argument that there was a commonly understood price structure and her decision to assume classwide impact and a common overcharge percentage for all types of CDTs implies that overcharges would be similar across product groups. These results also cast further doubt on this claim.

C. Contrary to Dr. Netz's Rebuttal, the adjustments I proposed to Dr. Netz's model substantially improve the performance of the model.

- 38. Dr. Netz does not take issue with the additional variables that I added to her model except to argue that they "do not explain materially more of CRT price changes than the variables I use."⁴⁷ In contrast, the variables that I added substantially improve the performance of her model based both on economic logic and on widely recognized econometric criteria. With respect to economic logic, I explained in detail both above and in my initial report why there is a strong economic case for including the additional conspiracy indicator variables in my re-estimation of Dr. Netz's model. Similarly, I explained the economic rationale for the four additional variables added to Dr. Netz's model in my initial report (worldwide shipments of desktop computers, shipping costs, Korean exchange rate and Korean labor costs). I also demonstrated that the coefficients on each of these variables have the signs that would be predicted by economic theory, that three of the four had high levels of individual statistical significance, and that the four as a group were jointly statistically significant.
- 39. Dr. Netz is incorrect that the additional variables that I added to her model "do not explain materially more of CRT price changes than the variables I [Dr. Netz] use."⁴⁸ As an initial matter, for the purpose of estimating overcharges, the amount of CRT price changes that is explained by the model is only one criteria for selecting a model, and is not, in fact, the most important criteria. As a general principle, in choosing between multiple alternative regression models it is more important that the chosen model provide an economically reasonable, unbiased and consistent estimate of the overcharge than it is for the model to have the highest possible R-Squared statistic. However, in this case the additional variables that I have added to her model (including both the additional conspiracy dummy variables and the four additional economic variables) have substantially improved Dr. Netz's model with respect to both criteria.

⁴⁵ As I explained in my initial report, the large positive coefficients on the 1995 and 1996 dummies are capturing the influence of factors that were not accounted for in Dr. Netz's model such as increased demand for larger monitors due to the introduction of Windows 95 and other factors; CDT capacity shortages due to demand expanding more rapidly than supply; glass shortages and other factors that led to significant CDT price increases in 1995 which persisted into 1996.

⁴⁶ See, e.g., Netz Merits Rebuttal Report, pp. 31-32.

⁴⁷ Netz Merits Rebuttal Report, p. 5.

⁴⁸ Netz Merits Rebuttal Report, p. 5.

40. Dr. Netz appears to be arguing that her model is robust when she states that the analysis she presents in her Exhibit RR-99 “shows that cartel-imposed overcharges remain positive and significant after adding the fuel index as well as the control variables suggested by Ms. Guerin-Calvert and Prof. Willig.”⁴⁹ However, this statement is misleading for a number of reasons. First, and most importantly, it is misleading because she only adds these variables into her model with a single conspiracy variable for 1995 – 2006. She never adds the additional conspiracy indicators that I demonstrated were critical to an economically valid approach to estimating the effect of the alleged conspiracy for the given model. Second, Dr. Netz's analysis and exhibit also are misleading because she only adds each of the additional variables to her model one at a time and never adds them all together. Third, she claims that the overcharges “remain positive and significant” despite the fact that the totality of changes I made to her model cause her overcharge estimate to drop from 22 percent to 1.6 percent (a decline of more than 90 percent) and also to become statistically insignificant.⁵⁰
41. In addition, even though this is not the most critical characteristic, the variables I added to Dr. Netz's model do in fact significantly improve the ability of the model to explain CDT price changes relative to Dr. Netz's model. As summarized in Table 2, the R-Squared statistic on the CDT model that Dr. Netz uses to calculate damages is 0.954. This implies that Dr. Netz's model does not explain approximately 4.6 percent of the variation in CDT prices.⁵¹ By comparison, the adjustments I have made to Dr. Netz's model raise the R-Squared to 0.971, which implies an unexplained variation of 2.9 percent. Accordingly, the adjustments I have made reduce the unexplained portion of CDT price movements by approximately 37 percent, which is both statistically and economically significant. Similarly, when I do the same calculation using the adjusted R-squared statistics the adjusted model results in a 36.5 percent reduction in the unexplained portion of CDT prices.⁵²

Table 2⁵³

**The Adjustments I Made to Dr. Netz's Overcharge Model Substantially Reduce
The Unexplained Variation in CDT Prices**

	R2	1-R2	Adjusted R2	1-Adjusted R2
Dr. Netz's Model	0.954	0.046	0.952	0.048
Adjusted Model	0.971	0.029	0.969	0.031
Percentage Change	1.8%	-36.9%	1.9%	-36.5%

⁴⁹ Netz Merits Rebuttal Report, p. 62.

⁵⁰ Guerin-Calvert Report, Table 8.

⁵¹ The amount of unexplained variation in a regression model is called the residual sum of squares. See, e.g., Damodar N. Gujarati, Basic Econometrics, Fourth Edition, p. 83.

⁵² See Netz Merits Rebuttal Report, footnote 293.

⁵³ See my backup file: “CDTs (Addition and Removal of Variables).xlsx”.

42. Dr. Netz's discussion also seems to imply that the variables she added are more important than the variables I added, and that the variables I added result in only trivial contributions to the total explanatory power of the model, or that the variables chosen by Dr. Netz alone provide a sound basis on which to model overcharges.⁵⁴ This is also misleading and incorrect.⁵⁵ For purposes of illustrating this point, the same statistical measures discussed above can be used to measure the incremental contribution that each independent variable makes to reducing the amount of unexplained variation in CDT prices. For example, Table 3 indicates that when we remove Dr. Netz's unemployment rate variable from her model the amount of unexplained variation in CDT prices increases by 2.2 percentage points compared to her base model. Similarly, the incremental effect of dropping her GDP variable from the model is to increase the amount of unexplained variation by 0.7 percentage points. By comparison, when we add the additional dummy variables for 1995 and 1996 to Dr. Netz's model, the unexplained variation in the model drops by a much larger 17.3 percent. Similarly, when we add the additional four control variables, the unexplained variation declines by an additional 19.5 percent. Accordingly, the overall effect of my adjustments to Dr. Netz's model is to reduce the unexplained variation in CDT prices by a total of 36.8 percent. As shown in Table 3, these effects are far larger than Dr. Netz's LCD, unemployment, and GDP variables either alone or in combination. By comparison, the cumulative effect of dropping Dr. Netz's LCD, unemployment and GDP variables from her model is to reduce the unexplained variation in CDT prices in her model by 5.1 percent.⁵⁶ In addition, the model which includes the additional variables I added shows a superior fit based on other widely used metrics of model fit such as adjusted R-squared, AIC and BIC.⁵⁷ In sum, this demonstrates that adding the additional dummy variables, as well as the other variables I added to the Netz model, did significantly contribute to the ability of the model to account for important supply and demand factors as well as to allow the effect of the alleged conspiracy to vary over time.

⁵⁴ "In addition, the proxy variables Defendants' experts suggest do not explain materially more of CRT prices changes than the variables I use." Netz Merits Rebuttal Report, p. 5.

⁵⁵ I note here without repeating my other criticisms of the Netz model.

⁵⁶ Dr. Netz also reports the results of a robustness check of adding a price index for the cost of fuel as an additional variable to her original overcharge model, but she does not appear to adopt this variable as part of her base model. When I added this variable to the adjusted Netz model it is not statistically significant and has little impact on the estimated overcharge. The overcharge estimate for 1997 through 2006 was very similar at 1.64 percent compared to my original estimate of 1.55 percent. See my backup file "Addition of IMF Fuel.xlsx" and Guerin-Calvert Report backup file "Summary of CDT Overcharge Models.xlsx".

⁵⁷ See my backup file "Netz and Guerin-Calvert Model Metrics.xlsx". See, e.g., Damodar N. Gujarati, Basic Econometrics, Fourth Edition, pp. 536-538.

Table 3⁵⁸

The Variables That I Have Added to Dr. Netz's Model Reduce Unexplained Variation in CDT Prices by Substantially More Than Dr. Netz's LCD, Unemployment, and GDP Variables

Specification:		Residual Sum of Squares/ Total Sum of Squares	% Difference (vs. Dr. Netz's Model)	Adjusted R-Squared	Absolute Difference (vs. Dr. Netz's Model)
(1)	Dr. Netz's Estimates of Overcharges	0.0456		95.18%	
Removal of Netz Controls					
(2)	LCD Share of Monitor Revenue	0.0463	1.6%	95.11%	0.07%
(3)	Time Trend	0.0476	4.5%	94.97%	0.21%
(4)	OECD Unemployment	0.0466	2.2%	95.08%	0.10%
(5)	OECD GDP	0.0459	0.7%	95.15%	0.03%
(6)	Korean Glass PPI	0.0662	45.3%	93.01%	2.17%
(7)	LCD Share, OECD Unemployment, and OECD GDP	0.0479	5.1%	94.95%	0.22%
Addition of Guerin-Calvert Controls					
(8)	Dr. Netz's Model with Dummy Variables for 1995, 1996, 1997-2006 & 2007	0.0377	-17.3%	96.00%	0.83%
(9)	Row (7) + Korean Labor Cost, US/Won Exchange Rate, Baltic Dry Shipping Index, and Desktop Shipments	0.0288	-36.8%	96.94%	1.76%
(10)	Row (7) + Korean Labor Cost, US/Won Exchange Rate, Baltic Dry Shipping Index, Desktop Shipments, and IMF Fuel Index	0.0287	-36.9%	96.94%	1.76%

Notes: (i) Figures in rows (2)-(7) are obtained by running Dr. Netz's overcharge model with the specified control variable(s) removed; (ii) The model in row (8) replaces Dr. Netz's two cartel dummies with four cartel dummies for 1995, 1996, 1997-2006, and 2007; (iii) Dr. Guerin-Calvert's models in rows (9) and (10) use the four cartel dummies used in row (8) and add the specified control variables; (iv) The removal of OECD unemployment and LCD share of monitor revenue include the removal of squared terms, and the removal of the Korean glass PPI includes the removal of its interactions with size.

Sources: (1) Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba; (2) Bloomberg L.P., OECD StatExtracts Database, Federal Reserve Bank of St. Louis, International Monetary Fund, Display Search.

43. Lastly, Dr. Netz claims that her model “is based on an analysis of all the data available, while Defendants’ experts apply the model to small subsets of the data.”⁵⁹ I simply note that the adjustments I have made to Dr. Netz's model to obtain the 1.6 percent overcharge estimate are estimated on the exact same data set as Dr. Netz's model.

⁵⁸ See my backup file “CDTs (Addition and Removal of Variables).xlsx”.

⁵⁹ Netz Merits Rebuttal Report, p. 5.

III.DR. NETZ'S CRITICISMS OF MY ANALYSIS OF CRT MARGINS ARE INCORRECT

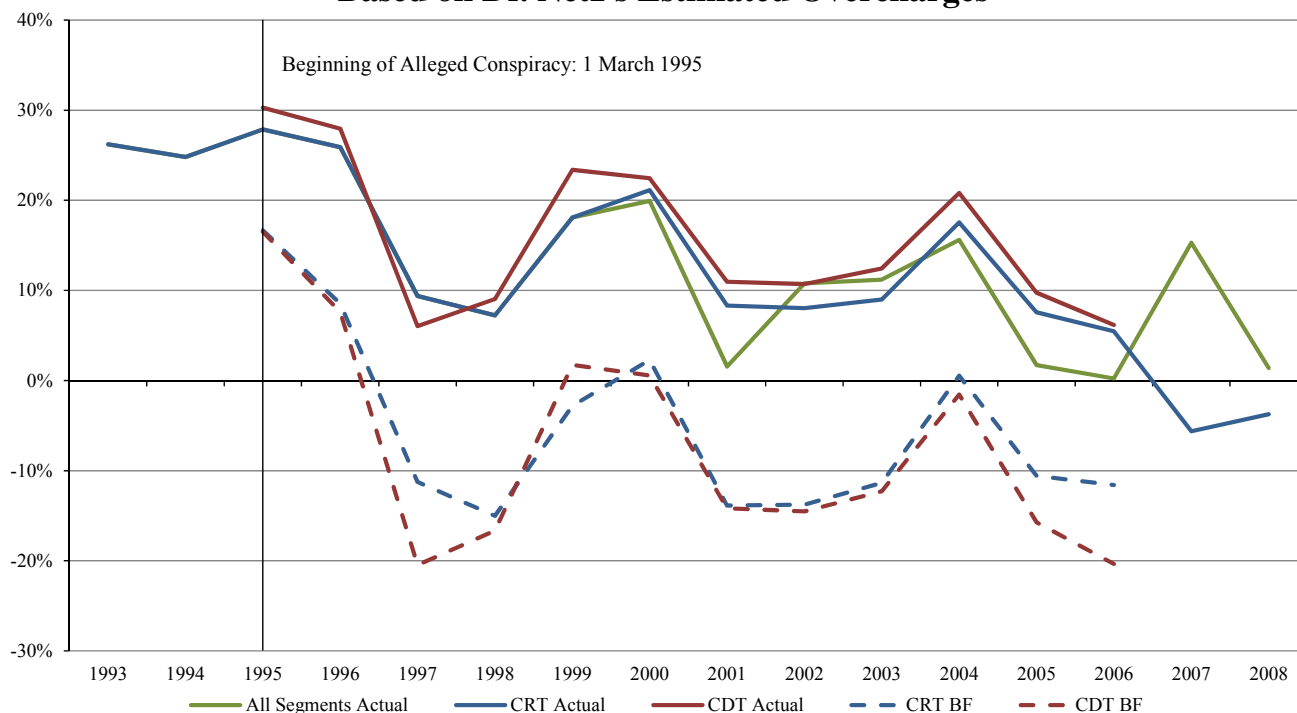
A. CRT manufacturer profitability did not increase at the start of the alleged conspiracy period as Dr. Netz's overcharge estimates imply.

44. In my initial report, I used financial information from several defendants to make two primary points: 1) Defendants' profit margins showed no significant increase at the beginning of the alleged conspiracy despite Dr. Netz's claim that prices were effectively increased substantially at that point in time; and 2) Dr. Netz's estimated overcharges imply that most defendants would have incurred substantially lower profitability in the but-for world, including large operating losses for an extended period of time. I also pointed out that such losses likely would have led some of the defendants to reduce the level of investment below what they had invested in the actual world, and in some cases may have caused firms to exit the industry earlier than they did in the actual world. Dr. Netz failed to consider any of these potential consequences of her large assumed overcharges in on manufacturer incentives her initial report.
45. With respect to the first point above, it is clear from the chart below that Chunghwa's gross margin did not increase at the beginning of the alleged conspiracy, despite Dr. Netz's allegations that large overcharges were imposed at that time. While Chunghwa's average gross margin experienced a slight increase from 1994 to 1995, it declined moderately in 1996, and sharply in 1997 and 1998, reflecting the substantial price competition during this period and the inability of the alleged conspiracy to stop such price declines. While Chunghwa's gross margins recovered somewhat during 1999 and 2000, the average margins during the alleged conspiracy period were substantially lower than those experienced prior to the alleged conspiracy.⁶⁰ For the five year period preceding the alleged conspiracy (1990-1994) Chunghwa CRT's average reported gross margin was 21.3 percent⁶¹. In comparison, the average for the first five years of the alleged conspiracy (1995-1999) was 17.9 percent, a substantial decline of 16 percent. Accordingly, based on this simple metric, margins were substantially lower during the alleged conspiracy period than they were during the five years preceding the alleged conspiracy period, not higher.⁶²

⁶⁰ See Guerin-Calvert Report backup file "a050_profit_margins.xlsx".

⁶¹ Chunghwa's annual reports indicate that prior to 1999, "the Company mainly manufactures CRTs, which account for more than 90% of the Company's total production volume." See e.g., Chunghwa 1998 Annual Report, at 110. Chunghwa's annual reports started reporting segment data starting 1999. Accordingly, it is reasonable to proxy Chunghwa CRT using its all segments data for 1990-1998. See my backup file "Chunghwa Margins Rebuttal.xlsx".

⁶² See my backup file "Chunghwa Margins Rebuttal.xlsx"

Figure 1⁶³**Actual & But-For Chunghwa Gross Margins
Based on Dr. Netz's Estimated Overcharges**

Note(s): Monochrome CRTs excluded from CDTs for the purpose of this case.
 1993-1999 CRT actual gross margins assumes All Segments gross margins.
 75% of the overcharge was applied to 1995 because alleged cartel period started in 1995Q2.
 CRT but-for (BF) margins assume All Segments' shares of net sales for 1995-99 gross income.
 CRT BF margins assume weighted average of Dr. Netz CDT/CPT overcharges by CDT/CPT sales.
 Most recently reported figures used whenever possible.

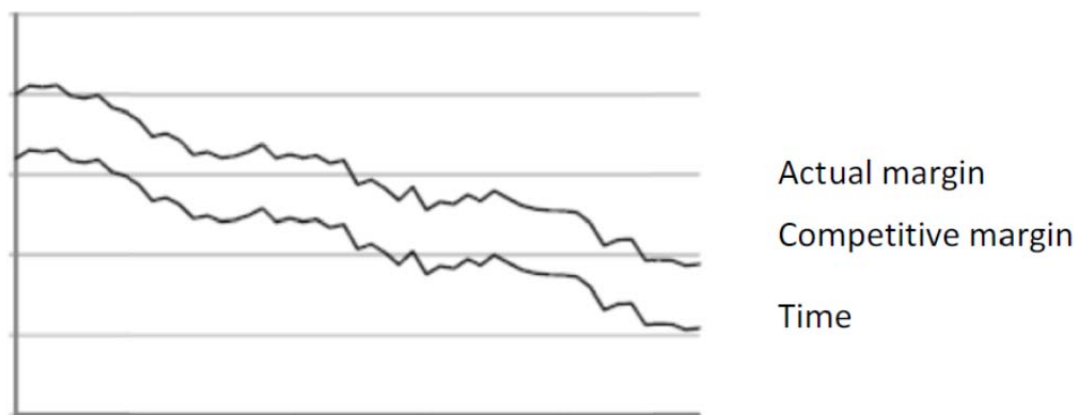
Data Source(s): Chunghwa Annual Reports & certified translations; CHWA00256934 - CHWA00256937; Defendant data; see Expert Report of Janet S. Netz, April 15, 2014, Exhibit 65.

Source File(s): Sensitivity Table.xlsx; CHWA00256934 - HIGHLY CONFIDENTIAL.xls; a050_profit_margins.xlsx

46. In her rebuttal report, Dr. Netz made a number of responses to my analysis of defendant's margins. For example, she argued that my analysis was invalid "because margins that decline over time are consistent with the existence of an effective cartel. An effective cartel is one which causes prices to be higher than they would otherwise be, absent the cartel's anticompetitive conduct; generally, margins are higher, too. A higher than competitive margin is consistent with a margin that falls over time, as illustrated in the following chart illustrates (sic):"⁶⁴

⁶³ See Guerin-Calvert Report backup file "a050_profit_margins.xlsx".

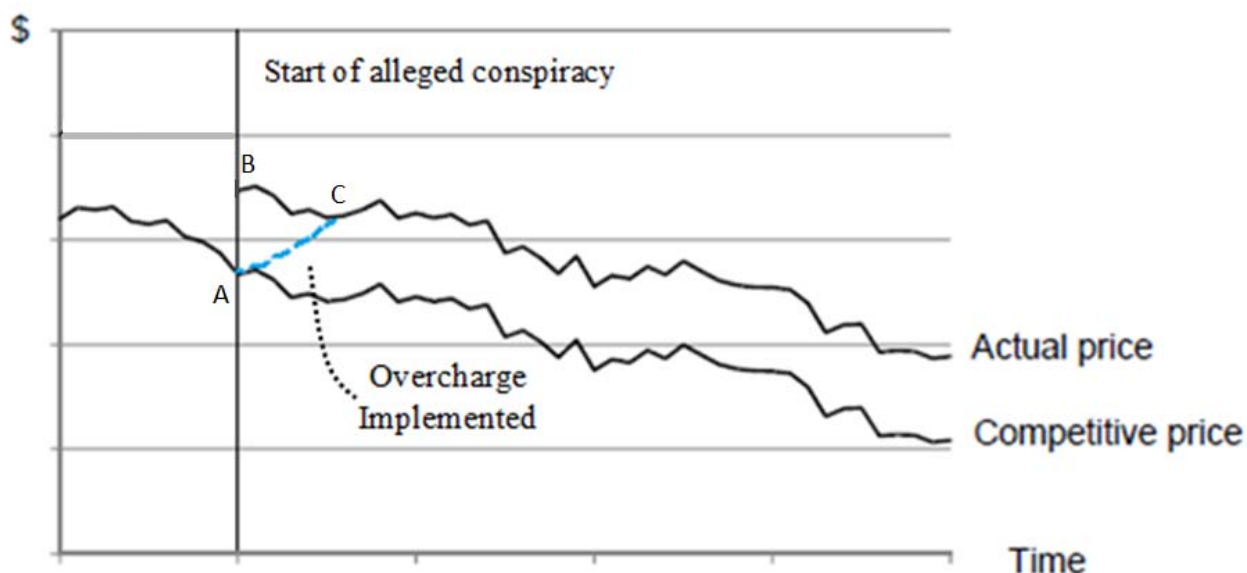
⁶⁴ Netz Merits Rebuttal Report, p. 52.

Figure 2⁶⁵

47. However, Dr. Netz's chart is highly misleading because it never shows where the alleged conspiracy begins or ends. Rather, it appears to assume an apparently constant overcharge that exists throughout the entire time period depicted in the chart. In contrast, if the period of her chart was expanded to show the beginning of her alleged cartel, we would be able to see the expected increase in the margin as the cartel became effective at raising prices and the margin that the firm actually earned transitioned from the “competitive margin” line in Dr. Netz's chart at point A in Figure 3 below to the “actual margin” line at point B as the overcharge was incorporated into the price. As discussed in my initial report, Dr. Netz’s analysis assumes that the full overcharge was incorporated into CRT prices at the beginning of the alleged conspiracy period as in the move from point A to point B. If instead, it took some time for any alleged overcharge to be incorporated, we might expect a movement such as that from point A to point C. In either case, one would expect some detectable increase in margins at the beginning of the alleged conspiracy period as the conspiracy allegedly successfully implemented the overcharge into prices and the firm transitioned from the “competitive margin” to the higher “actual margin.”⁶⁶ In contrast, as shown in Figure 1 above, Chunghwa’s actual margin simply declined substantially at the onset of the alleged conspiracy from 1995 through 1998, rather than increasing.

⁶⁵ Netz Merits Rebuttal Report, p. 56.

⁶⁶ I note that for purposes of exposition, this hypothetical example holds constant all of the other factors that could have led to changes in margins contemporaneous with the alleged cartel.

Figure 3**Dr. Netz's Chart Modified to Illustrate the Beginning of the Alleged Conspiracy
And the Imposition of the Overcharge**

48. Dr. Netz also argues that my analysis is invalid because I did not explicitly control for other factors that may have influenced CRT margins over time. While it would be desirable in principle to control for other factors by (for example) using a regression approach, this would be difficult in practice given the small number of observations in the annual margin data. For example, while the overcharge data set that both I and Dr. Netz used had 1,114 observations⁶⁷, there would be only 19 annual observations on Chunghwa margins during 1989 – 2007. In addition, it seems unlikely that attempting to control for other factors would alter my basic conclusion that Chunghwa's margins did not increase at the beginning of the alleged conspiracy. For example, based on one measure of macroeconomic performance, the US unemployment rate, the economy was actually stronger during 1995-1999 with an average unemployment rate of 4.9 percent than it was during 1990-1994 when the average was 6.6 percent.⁶⁸ Similarly, the variables used by Dr. Netz in her overcharge model also do not indicate that changes in the market conditions that she controls for were driving the declines in Chunghwa's margin during the alleged cartel period.⁶⁹

⁶⁷ See Guerin-Calvert Report backup file "Effect of Allowing Estimated Overcharge to Vary Over Time.xlsx".

⁶⁸ Economic Report of the President, 2014, p. 379. Council of Economic Advisors, The White House, available at <http://www.whitehouse.gov/administration/eop/cea/economic-report-of-the-President/2014>, accessed on October 21, 2014.

⁶⁹ For example, the cost of specialty glass in Korea, the only CDT manufacturing cost variable included by Dr. Netz in her overcharge regression, generally decreased after 1995. In particular, the mean value of the Korean glass cost index used by Dr. Netz was 6 percent lower during the Q2 1995- Q4 1999 period than during the Q1 1990- Q1 1995 period. Similarly, the

49. Dr. Netz also argues that my analysis of CRT margins is invalid because the CRT industry was characterized by excess capacity and declining demand.⁷⁰ Under these conditions, Dr. Netz argues that CDT prices need only have covered variable costs, and did not need to make any contribution to fixed costs or “sunk” investments in production facilities in order to induce CRT manufacturers to continue supplying products to the marketplace. Accordingly, she argues that accounting measures of profitability which reflect historical investments such as depreciation are not relevant for determining whether CRT manufacturers would have continued to supply. As I explain further in section III.C. below, I disagree with the argument that capital costs were irrelevant to all CDT manufacturer production and investment decisions during the alleged conspiracy period. However, to illustrate that this argument does not significantly affect my conclusions about the changes in Chunghwa CRT’s margins over time, I have also attempted to illustrate the pattern of Chunghwa CRT’s margins during the relevant period if I eliminate accounting based depreciation from the calculations. This represents the most extreme form of Dr. Netz’s scenario in which all of Chunghwa’s historical investments are completely sunk and non-salvageable or otherwise irrelevant for manufacturers’ decisions on investment or production during the alleged conspiracy period. The resulting adjusted margins are summarized in Table 4.
50. For the five year period preceding the alleged conspiracy (1990-1994) the average of the adjusted gross margins that do not subtract depreciation was 25.8 percent. In comparison, the average for the first five years of the alleged conspiracy (1995-1999) was 23.0 percent, a decline of 11 percent.⁷¹ Accordingly, the same relationship holds for the gross margins that are adjusted for depreciation as for the reported margin -- margins were actually lower during the alleged conspiracy period than they were during the five years preceding the alleged conspiracy period. Accordingly, the conclusion that Chunghwa CRT margins were lower during the alleged conspiracy period than they were before the alleged conspiracy is not affected in any significant way by the manner in which Chunghwa calculated depreciation over this period.⁷²
51. As shown in Table 4, I have also performed similar calculations using other measures of profitability. As in my previous report, I report figures for Chunghwa CRT’s operating margin defined as operating income divided by revenue. The primary additional costs that are subtracted from gross margin to obtain operating margin are selling costs, general and administrative costs and R&D. As with Chunghwa’s gross margin described above, Chunghwa CRT’s operating margin also shows a substantial decline from the

demand variables used by Dr. Netz generally show higher demand during the first five years of the alleged conspiracy than in the prior period. The mean value of OECD GDP was 26 percent higher during the Q2 1995- Q4 1999 period than during the Q1 1990- Q1 1995 period, and the mean value of the unemployment rate in OECD economies was 5 percent lower during the Q2 1995- Q4 1999 period at 6.85 percent than during the Q1 1991- Q1 1995 period (7.18 percent). See my backup file “Mean Comparison 90-95Q1 vs Alternative Periods.xlsx”.

⁷⁰ See, e.g., Netz Merits Rebuttal Report, pp. 52, 66-67. In her October 31, 2014 deposition, Dr. Netz clarified her opinion and stated: “I said in such situations the decline in demand and excess capacity that competition can become ruinous, but I did not study whether or not it fell into that category in the but-for world.” Netz Merits Rebuttal Deposition, p. 78.

⁷¹ See my backup file “Chunghwa Margins Rebuttal.xlsx”.

⁷² The adjusted margins during the alleged conspiracy period are even lower if we use the full alleged conspiracy time period rather than just the first five years. For example, using the full 1995 through 2007 alleged conspiracy period, the average adjusted gross margin is 20.0 percent compared to 23.0 percent for 1995-1999 and 25.8 percent for 1990 through 1994. For these calculations and similar calculations for other margins, see my backup file “Chunghwa Margins Rebuttal.xlsx”.

pre-alleged conspiracy average level of 16.9 percent during 1990 – 1994 to an average of 11.9 percent during 1995 – 1999, the first five years of the alleged conspiracy period.⁷³ This reflects a decline of 30 percent.

52. Another potentially relevant earnings metric is known as earnings before interest, taxes, depreciation, and amortization (i.e., EBITDA). Similar to the gross margin calculated without subtracting depreciation and amortization discussed above, EBITDA is calculated without subtracting out depreciation and amortization. This metric is sometimes used by financial analysts as a measure of a firm's ability to generate operating cash flow. Since it does not subtract out non-cash expenses such as depreciation and amortization, it also is defined in a way that is consistent with Dr. Netz's extreme scenario in which none of the historical capital investment of the firm is relevant for decisions about ongoing production or investment. This metric also produces consistent results with the other earnings metrics. The average EBITDA margin shows a substantial decline from the pre-alleged conspiracy average level of 21.8 percent during 1990 – 1994 to an average of 17.6 percent during 1995 – 1999, the first five years of the alleged conspiracy period. Accordingly, the conclusion that Chunghwa CRT's profitability was lower during the alleged conspiracy period than it was during the prior time period does not depend on the particular measure used to measure profitability, including whether the earnings are measured before or after depreciation and amortization.

⁷³As I reported in my initial report, while we have information on Chunghwa's gross margins for CRTs, Chunghwa did not report a separate operating margin for CRT sales. I estimated the CRT operating margin by assuming that any unallocated operating expenses would be the same percentage of revenue for CRT sales as for Chunghwa's total sales. LCD sales did not become a significant portion of Chunghwa's revenue until after 1999.

Table 4⁷⁴**Chunghwa CRT Profit Margins Did Not Increase at the Beginning of the Alleged Conspiracy**

	1 Pre-Alleged Conspiracy 1990-1994	2 During Alleged Conspiracy 1995-1999	3 Percentage Change (Col 2 - Col 1) / Col 1
<i>Gross Margin</i>	21.3%	17.9%	-16%
<i>Gross Margin, Excluding Depreciation Expense</i>	25.8%	23.0%	-11%
<i>Operating Margin</i>	16.9%	11.9%	-30%
<i>EBITDA Margin</i>	21.8%	17.6%	-19%

Notes:

EBITDA equals operating income plus depreciation and amortization expense.

NT\$ to \$ exchange ratio per Capital IQ for December 31 of each fiscal year.

1989-1998: CRT operations are assumed to equal consolidated operations of Chunghwa Picture Tubes. Chunghwa Picture Tubes first reports LCD sales in 1996 with segment sales of NT\$ 8.7 M, 10.7 M, and 28.2 M, which represent 0.0%, 0.0%, and 0.1% of total sales in 1996, 1997, and 1998, respectively.

1999: Gross Profit & Depreciation Expense - CRT operations are equal to consolidated totals minus LCD and Other from non-consolidated segment reporting. Operating Expenses & Amortization Expense - CRT figures are a pro-rata allocation of consolidated company operating expense by segment revenue.

Sources:

Chunghwa Picture Tubes Annual Reports; and CHWA00256934 - HIGHLY CONFIDENTIAL.xls.

B. Dr. Netz's estimated overcharges imply that CRT manufacturers would have incurred very low margins in the "but-for" world, including large losses.

53. I have also estimated the but-for margins for each of these earnings metrics in Table 5 by subtracting Dr. Netz's estimated overcharges from revenue. For each of the earnings measures, the but-for measure during the alleged conspiracy period can be compared to the average value for that same metric prior to the alleged conspiracy to provide an estimate of how the firm would have fared in Dr. Netz's but for world, assuming that per-unit costs would have been the same in the but-for world as they were in the actual world. For example, the average value of the reported gross margin for Chunghwa CRT would have declined from a positive 21.3 percent during the five year period prior to the alleged conspiracy (1990-1994) to an average value of negative 0.6 percent in the but-for world during 1995-1999, a percentage decline of 103 percent.⁷⁵ For the metric of gross margin excluding depreciation, the average value would have declined from a 25.8 percent prior to the alleged conspiracy to an average value of 5.7 percent, a percentage decline of 78 percent.⁷⁶

⁷⁴ See my backup file "Chunghwa Margins Rebuttal.xlsx".

⁷⁵ See my backup file "Chunghwa Margins Rebuttal.xlsx".

⁷⁶ See my backup file "Chunghwa Margins Rebuttal.xlsx".

54. As shown in Table 5, I have also performed similar calculations using other measures of profitability. As in my previous report, I report figures for Chunghwa's operating margin. The operating margin subtracts additional operating costs from the gross margin such as selling costs, general and administrative costs, and R&D. For the question of evaluating new investment these costs would be relevant to the extent that incremental expenditures in these areas would be necessary to support the sales that would be generated by the new investment. Similarly, these costs would be relevant for an analysis of a firm's decision to stop production to the extent that these costs could be avoided by a decision to stop producing and selling a particular product. For the metric of operating margin, the average value would have declined in the but-for world from a positive 16.9 percent margin in the pre-alleged conspiracy period to a negative 7.9 percent in the first five years of the alleged conspiracy period, a percentage decline of 147 percent. For the metric of EBITDA which is equal to operating income plus depreciation and amortization, the average value would have declined from a positive margin of 21.8 percent to negative 0.8 percent, a percentage decline of 104 percent.
55. The bottom line is that based on every metric, whether measured before or after depreciation and amortization, Chunghwa CRT's profitability would have been far lower in Dr. Netz's assumed but-for world than it actually was during the pre-alleged conspiracy period. Moreover, Chunghwa would have incurred large and sustained operating losses – much larger and longer lasting than actually occurred. As I showed in Figure 34 of my initial report, the but-for operating margins for Chunghwa are negative for all years except 1995 and 1996, which were years when margins likely were relatively high due to high demand, capacity shortages, and other reasons unrelated to the alleged conspiracy. The but-for operating losses for Chunghwa using Dr. Netz's overcharges exceed 20 percent of revenue for five of the years during the alleged cartel period, and the simple average of Chunghwa's but-for annual operating margins over the 1995-2006 period is negative 12.8 percent.⁷⁷ Accordingly, Dr. Netz's overcharge estimates imply that Chunghwa would have continued to incur large losses on its CRT business for many years. Dr. Netz's overcharge estimates are not at a level that would result in CDT manufacturers like Chunghwa earning a comparable level of profit in the but-for world that it earned during the 1989-1994 period when there was no alleged conspiracy. Rather, Dr. Netz's overcharges imply pricing would have been at a level which would have produced substantially lower profitability (including very large operating losses) than that which occurred during 1989-1994, a period for which there are no allegations of conspiracy. In addition, as discussed below, Dr. Netz assumes that the industry would have continued to make substantial new investments despite such poor financial performance.

⁷⁷ These calculations are detailed in my Guerin-Calvert Report backup file "a050_profit_margins.xlsx". While I have information on Chunghwa's gross margins for CRTs, Chunghwa did not report an operating margin for CRT sales. I estimated the CRT operating margin by assuming that any unallocated operating expenses (e.g., corporate overhead) would be the same percentage of revenue for CRT sales as for Chunghwa's other sales.

Table 5⁷⁸**Dr. Netz's Overcharge Estimates Imply That CRT Profit Margins Would Have Been Substantially Lower During the Alleged Conspiracy Period than in Prior Years**

	1 Pre-Alleged Conspiracy 1990-1994	2 During Alleged Conspiracy 1995-1999	3 Percentage Change (Col 2 - Col 1) / Col 1
<i>But-For Gross Margin</i>	21.3%	-0.6%	-103%
<i>But-For Gross Margin, Excluding Depreciation Expense</i>	25.8%	5.7%	-78%
<i>But-For Operating Margin</i>	16.9%	-7.9%	-147%
<i>But-For EBITDA Margin</i>	21.8%	-0.8%	-104%

Notes:

EBITDA equals operating income plus depreciation and amortization expense.

NT\$ to \$ exchange ratio per Capital IQ for December 31 of each fiscal year.

1989-1998: CRT operations are assumed to equal consolidated operations of Chunghwa Picture Tubes. Chunghwa Picture Tubes first reports LCD sales in 1996 with segment sales of NT\$ 8.7 M, 10.7 M, and 28.2 M, which represent 0.0%, 0.0%, and 0.1% of total sales in 1996, 1997, and 1998, respectively.

1999: Gross Profit & Depreciation Expense - CRT operations are equal to consolidated totals minus LCD and Other from non-consolidated segment reporting. Operating Expenses & Amortization Expense - CRT figures are a pro-rata allocation of consolidated company operating expense by segment revenue.

Sources:

Chunghwa Picture Tubes Annual Reports; and CHWA00256934 - HIGHLY CONFIDENTIAL.xls.

C. The implications of substantially reduced CRT profitability on production and investment decisions in the but-for world

56. As mentioned above, Dr. Netz also argues that my analysis of CRT margins is invalid because the CRT industry was characterized by excess capacity and declining demand.⁷⁹ Under these conditions, Dr. Netz argues that CDT prices need only have covered variable costs, and did not need to make any contribution to fixed costs or “sunk” investments in production facilities in order to induce CRT manufacturers to continue supplying products to the marketplace. Accordingly, she argues that accounting measures of profitability which reflect historical investments such as depreciation are not relevant for determining whether CRT manufacturers would have continued to supply in her but-for world.

57. However, as I explained in my initial report, this argument ignores the fact that many CRT manufacturers continued to make substantial new investments throughout much of the alleged cartel period. For

⁷⁸ See my backup file “Chunghwa Margins Rebuttal.xlsx”.

⁷⁹ Netz Merits Rebuttal Report, p. 52, 66-67.

example, Chunghwa's financial statements report CRT-related capital expenditure of more than \$649 million from 1999 to 2006.⁸⁰ Manufacturers would not have made such new investments in the industry unless they believed that they would be able to earn at least a normal economic return on such new investments, including any additional required capital costs or overhead costs. Accordingly, gross margins and operating margins calculated net of depreciation and other capital costs (including a return on capital) provide relevant information for evaluating how CDT manufacturers would have viewed the attractiveness of such new investment.

58. New investments of the same scope and magnitude as those that were made in the actual world would have been highly unlikely in Dr. Netz's but-for world where she argues that CDT prices would have been 22 percent lower than those that prevailed in the actual world and that CPT prices would have been nine percent lower. To the extent that some of the investment that occurred in the actual world would not have occurred in Dr. Netz's but-for world, this would have had the effect of raising prices relative to those assumed by Dr. Netz, reducing product innovation or variety, or having other effects that would have harmed consumers. Dr. Netz completely ignored these potential effects of her large claimed overcharges and implied but-for prices in her initial report.⁸¹
59. Dr. Netz argues that her view of the but-for world is "consistent with the continued supply of CRTs by some firms despite prices that are too low to cover fixed costs."⁸² She also argues that her but-for world is "consistent with exit from the industry of some firms that supplied CRTs in the actual world."⁸³ She argues that a competitive "shakeout" likely would have occurred with the surviving firms experiencing economies of scale and other efficiencies.⁸⁴ Dr. Netz also claims that the result of this shakeout would be enough surviving firms producing sufficient quantities of CDTs (despite likely incurring large and persistent reported losses) to keep industry output from declining below the levels experienced in the actual world. However, she offers little or no empirical analysis to support her implicit assumption that the but-for CDT industry would have been willing to make the same levels of investment and produce the same levels of industry output and product variety, etc. with such substantially lower prices.
60. There are a number of economic factors that cast doubt on Dr. Netz's assumption that any plausible efficiencies in her assumed "competitive shakeout" would be sufficient to maintain actual levels of industry output and investment despite substantially lower (i.e. 22 percent lower) prices. For example, Dr. Netz argues that the quantity of CDTs demanded would increase substantially at the lower but-for price. However, since CDTs are only one part of computer monitors, and computer monitors are just one part of larger computer systems, the effective decline in the prices of computer systems experienced by

⁸⁰ During the period 1999-2006, Chunghwa spent more than NT\$ 21.7 billion investing in its CRT operations. This corresponds to more than \$649 million. Chunghwa does not report segment breakdown in capital expenditure for prior years. See also Guerin-Calvert Report, ¶137 and my Guerin-Calvert Report backup file "a057_chunghwa_crt_capex.xls".

⁸¹ The fact that several CDT manufacturers exited the industry during the alleged cartel period also indicates that such firms did not believe they were earning a sufficient return on capital, even in the actual world. It is very likely that such firms would have exited the industry even earlier in Dr. Netz's but-for world.

⁸² Netz Merits Rebuttal Report, p. 66.

⁸³ Netz Merits Rebuttal Report, p. 66.

⁸⁴ Netz Merits Rebuttal Report, pp. 68, 70.

consumers would be much smaller in percentage terms than the decline in CDT prices. In addition, she offers no convincing analysis to document her claims of substantial unexploited scale economies in the CDT industry and the ability to achieve them as she asserts, in light of other characteristics of the CDT industry that affected firms' ability to achieve scale economies in the actual world, such as consumer demand for innovation and product variety. Moreover, the surviving firms in any competitive shakeout would have to do even more than maintain their historical output and investment in the face of substantially lower prices. They would have to expand their output and investment beyond what they did in the actual world in order to offset declines in output and investment by the firms that reduce output and/or exit the industry.⁸⁵ Given that a significant number of firms actually did exit the CDT industry in the actual world, such reductions in output and investment by such firms would likely be substantial and occur earlier in time in Dr. Netz's competitive shakeout scenario.

61. Despite all these complex economic questions, Dr. Netz provides little or no empirical or other analysis to support her arguments that significant economies of scale and other efficiencies would not only be forthcoming in the but-for world, but also that they would be sufficient and aligned effectively across manufacturers to induce the surviving manufacturers to expand their investment and production by enough to offset the effects of any exits or reductions by other firms.⁸⁶ Nor does she provide any analysis or exposition of how the competitive dynamics might have differed in the but-for world in such a "shakeout" scenario, or the implications of those for the realization or effect of any such economies of scale.
62. Dr. Netz also points to the fact that some CRT manufacturers experienced operating losses in the actual world as evidence that they would have been willing to continue producing despite such losses in the but-for world.⁸⁷ However, the fact that some firms may have experienced operating losses in the actual world does not imply that these firms would not have responded by reducing output and/or investment in a but-for world where they experienced much larger losses for a much longer period of time. Firms may be willing to incur some level of losses for some period of time. However, the larger those losses are, and the longer they persist, the more likely it is that the firm will conclude that future investment and/or production are unlikely to be profitable.
63. While it may be difficult to predict exactly how Chunghwa or any other particular firm in the industry would have responded to such a dramatic deterioration in financial performance, it is highly speculative to simply assume – as Dr. Netz does – that some sort of vague industry "shakeout" would have occurred and that such a "shakeout" would have resulted in the surviving firms as a whole making the same level of investment and producing the same quantity and variety of CDTs as the industry produced in the actual world despite dramatically lower prices and profitability.

⁸⁵ Clearly the capital costs associated with such expansions and investments would be relevant to these economic decisions.

⁸⁶ Similarly, Dr. Netz offers no analysis to indicate that the surviving firms in her competitive shakeout would be able to convince potential investors or lenders to provide additional capital for such investments in light of substantially lower prices and margins.

⁸⁷ See, e.g., Netz Merits Rebuttal Report, p. 67 and footnote 325.

64. Dr. Netz's argument that the capital cost of existing facilities would be irrelevant also assumes that the existing production facilities have no alternative use. As mentioned above, if and where CDT manufacturers had some ability to convert some CDT lines to CPT lines (with necessary time and investment), these opportunity costs would continue to be relevant for deciding whether or not to keep these lines in CDT production. I reported some potential examples in my initial report -- LPD's 2004 annual report indicated that "In 2004, we had to close down our CPT facility in Aachen, Germany, and our glass plant in Simonstone, UK, while we also had to reduce our CDT exposure Nanjing, China by partly converting production lines toward CPT."⁸⁸ Similarly, Panasonic's economic expert Dr. Darrell Williams reported that "in connection with its exit from the CDT manufacturing business, Panasonic Corporation transferred CDT capacity to be used as CPT capacity."⁸⁹ Even Dr. Netz in her initial merits report recognized that "CRT production facilities have some capability for supply substitution by converting CRT production lines from producing tubes for one application to producing tubes of the other type."⁹⁰

IV. DR. NETZ'S PRICE STRUCTURE ARGUMENTS

A. Dr. Netz's claims regarding CRT price structure

65. Dr. Netz argues that "the cartel did not need to set target prices for all products because the prices of CDTs and CPTs are tightly related to their product characteristics (e.g., size and finish) via a price structure."⁹¹ She argues that at any given point in time, the manufacturers had a common understanding about the differentials in prices between products with different characteristics so that the cartel only needed to "set a handful of target prices and all participants would understand the implications for prices of other related CRTs."⁹² She also argues that this "price structure" argument is supported by the fact that her "hedonic" regression analysis explains a large portion of the total variation in CDT prices.⁹³ Dr. Netz's price structure argument suffers from a number of fundamental flaws.

⁸⁸ LPD-NL00214381 - LPD-NL00214444, at 4388. Similarly, a 2003 document reports that Chunghwa converted one of its Malaysia CRT lines from CDT to 14-inch CPT. LG Philips Displays, 06 February 2003, Global C-CRT Line Status, PHLP-CRT-015235. See also Netz Merits Report Exhibit 3.

⁸⁹ Expert Report of Dr. Darrell Williams, In re: Cathode Ray Tube (CRT) Antitrust Litigation, dated August 5, 2014, p. 14 (citing Panasonic 30(b)(6) Deposition of Tatsuo Tobinaga, July 16-17 2012, at 147:9-147:18).

⁹⁰ Netz Merits Report, p. 13. Similarly, in her rebuttal report, Dr. Netz stated that "Supply and/or demand substitution could tend to blunt the effects of raising the price of some CRTs because manufacturers and/or consumers would tend to substitute to other CRTs." Netz Merits Rebuttal Report, p. 30.

⁹¹ Netz Merits Rebuttal Report, p. 10.

⁹² Netz Merits Rebuttal Report, p. 31.

⁹³ Netz Merits Rebuttal Report, pp. 31-32.

B. Dr. Netz's price structure argument is undermined by a variety of empirical evidence.

66. Dr. Netz's argument that the cartel needs only to "set a handful of target prices and all participants would understand the implications for prices of other related CRTs"⁹⁴ implies that the fact of impact, and potentially the magnitude of overcharges would be similar for different sizes and types of CDTs. If this were not the case, it would be very difficult for manufacturers to "understand what the implications" of a particular target price on, say, 14 inch CDTs would be for prices of 15 and 17 inch CDTs as Dr. Netz claims.⁹⁵ The fact that Dr. Netz made no attempt to estimate different overcharges for different sizes of CDTs also is consistent with a view that overcharges would be relatively similar across different types of CDTs. However, these implications of Dr. Netz's price structure theory and overcharge model are directly contradicted by the evidence presented above that Dr. Netz's own model of CDT overcharges produces substantially different estimated "overcharges" for different sizes of CDTs. In particular, it produces no overcharges at all for CDTs greater than 15 inches, a category which includes a substantial majority (i.e. 65 percent⁹⁶) of all CDT sales during the alleged cartel period.⁹⁷
67. Dr. Netz's price structure theory also is refuted by the analysis I presented in my initial report showing that changes in Dr. Netz's target price index do a very poor job explaining changes in the actual prices of CDTs for which Dr. Netz was not able to identify a target price. If CDT manufacturers "understood the implications" of target prices on one category of CDTs for the implicit collusive prices on those categories of CDT for which no explicit target prices were specified, I would expect that Dr. Netz's target price index would exhibit a strong relationship with the prices of these non-targeted CDTs. However, as I demonstrated in paragraphs 76 and 77 of my initial report, this clearly is not the case. Quarterly changes in Dr. Netz's target price index exhibited very little ability to explain contemporaneous changes in actual CDT prices.
68. Similarly, an analysis of Dr. Netz's own hedonic regressions, which she claims to be the primary analytical support underlying her claims regarding the CDT price structure, also undermines these claims. As a foundational matter, even if Dr. Netz's hedonic regression model explain a high percentage of CDT price variation as she claims, the fact that Dr. Netz might be able to estimate an econometric model using a data set that includes detailed transactions level data on many thousands of actual CDT transactions for

⁹⁴ Netz Merits Rebuttal Report, p. 31.

⁹⁵ Similarly, in a prior Declaration, Dr. Netz stated that "The relative prices that are reflected in the price structure are substantially the same in the actual world as in the but-for world. Relative prices are ratios of prices at a point in time; if both prices change by the same percentage, the relative price is unchanged." Rebuttal Declaration of Janet S. Netz, Ph.D., in Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, February 15, 2013, p. 39.

⁹⁶ See my backup file "Large CDT Sales as % of Total CDT Sales.xlsx".

⁹⁷ Dr. Netz acknowledged as a conceptual matter that where the market forces impacting different sizes of CRTs vary, the fact that the alleged cartel may have impacted prices of smaller CRTs does not necessarily imply that the prices of larger CRTs necessarily would be impacted. See, e.g., Netz's response to the following deposition question: "Have you found that the prices of CRTs at a point in time are sufficiently related to each other that those relationships would necessarily mean that if there was only price-fixing for CPTs below 21 inches, 21 inches or below, that there would be a price effect on a CRT that was 36 inches? A. With the information in the hypothetical, there may or may not be an effect of 36 inches, and I would have to look at the underlying data to determine the answer to that question." Netz Merits Rebuttal Deposition, pp. 61-62.

many different manufacturers that was constructed many years after the fact does not prove that individual CDT manufacturers would have been able to effectively replicate the output of such an analysis at each point in time during the alleged conspiracy with far less data.⁹⁸

69. Moreover, even if we accept Dr. Netz's assumption that the hedonic regression model provides some information about contemporaneous manufacturer understanding of relative CDT prices in the marketplace, her hedonic regression models are consistent with substantial remaining differences between actual CDT prices and the prices predicted by the hedonic models. For example, I have calculated the percentage of transactions for which actual prices were at least 5 percent different (in absolute value) than the predicted prices from the hedonic model. Price differences of five percent or sometimes less often were seen to be economically significant in the CDT industry.⁹⁹ For the entire period used to estimate the hedonic model the percentage of transactions with at least a five percent difference was 56.5 percent.¹⁰⁰ The fact that competitively significant differences are so prevalent, even in this kind of a large scale hedonic regression model, further undermines Dr. Netz's price structure claims.

70. In addition, as I showed in my initial report, hedonic regressions that are very similar to those estimated by Dr. Netz indicate that the price differentials between different sizes of CDTs and different manufacturers of CDTs changed substantially over time.^{101 102} While Dr. Netz argues that her price

⁹⁸ For example, Dr. Netz's hedonic regressions include dummy variables for each combination of buyer and seller in the dataset. This methodology effectively assumes that each of the participants in the alleged conspiracy would have had such detailed information on customer and manufacture specific pricing differentials. Obviously, this kind of detailed information goes way beyond Dr. Netz's claims that prices can be explained by a "small number of product characteristics." See Netz Merits Report, pp. 5, 7. Accordingly, Dr. Netz's hedonic regressions greatly overstate what the manufacturers would know about relative prices for this reason as well.

⁹⁹ See, e.g., Produced documents suggest that price differences of five percent or sometimes less often were considered to be competitively significant in the CDT industry. See, for example, CHU00028589 - 8590, at 8590.01E; CHU00028728 - 8729, at 8728.01E and 8729E; CHU00028763 - 8767, at 8763.01E - 8763.02E; CHU00071480 - 1482, at 1481E; CHU00031279 - 1282, at 1280.02E; CHU00030888 - 0893, at 0890.02E; and, Jaemin Lee SDI CRT 30(b)(6) Deposition, Volume 2, at 189:3-6.

¹⁰⁰ The estimated percentage of 56.5 percent is based on estimating an annualized version of Dr. Netz's hedonic regression model presented in her rebuttal report. See my backup file "prediction_gap_5pct.log". I have also estimated an annualized hedonic regression model which includes additional control variables for exchange rates, weights observations by sales quantities and screens outliers by dropping the top and the bottom 2.5% outlier prices by product type (CDT), tube size and year. Even with these modifications, the (absolute) difference between actual observed CDT prices and prices predicted by the hedonic regressions exceed 5% for roughly half (49.2 percent) of observations. See my backup file "prediction_gap_5pct.log".

¹⁰¹ Guerin-Calvert Report, ¶¶84-85. The manufacturer differentials reported in ¶85 of my initial report included exchange rate indicator variables. Since these exchange rate variables may be significantly correlated with the manufacture indicator variables, I have estimated manufacture premiums without the exchange rate variables. See my backup file "mfr_premium_CDT.xls". These regressions continue to demonstrate that price differentials varied significantly across manufacturers during the alleged conspiracy. For example, the differential in prices of SDI over Chunghwa (controlling for other factors using Dr. Netz's data and hedonic regression approach) varied from a high of 4.4 percent in 2005 to a low of -1.0 percent in 1999. Similarly, the differential of Toshiba Corp. over Chunghwa based on the hedonic model varied from a high of 14.1 percent in 1997 to a low of -0.8 percent in 1995. The differential of LPD over Chunghwa based on the hedonic model varied from a high of 11.3 percent in 1999 to a low of -6.8 percent in 2001. The manufacturer premiums were statistically significant in approximately 71 percent of the cases. See my backup file: "mfr_premium_sig_CDT.csv".

¹⁰² In this regression, the independent variables are: time trend, squared time trend, dummy variables for CDT size, aspect ratio and finish, buyer-seller dummies, and exchange rates. Regressions were weighted by quantity. Differences in the price

structure theory is consistent with changes in relative prices over time, the more frequent are such changes, and the greater the extent to which they are differentiated across different types of CDTs, the less plausible it becomes that CDT manufacturers would be able to maintain a “common understanding” about the implications of changes in target prices for one type of CDT for prices on many other types and sizes. As shown in detail below, CDT price changes do, in fact, exhibit great variation.

71. Dr. Netz's “price structure” theory also is undermined by the substantial variation in CDT price levels and price changes. This variation reflects the fact that different types of CDTs are affected by different competitive forces, and exhibit widespread and substantial lack of adherence to target price changes. As described above, Dr. Netz argues that any given point in time, the manufacturers had a common understanding about the differentials in prices between products with different characteristics so that the cartel needs only to “set a handful of target prices and all participants would understand the implications for prices of other related CRTs.”¹⁰³ This theory implies that the differentials in prices between CDT products would need to be relatively common across many products (so as to be determined by a “handful” of target prices) and somewhat stable, at least over relatively short periods of time. To the extent that there are a very large number of relevant price differentials, and relative prices change substantially from quarter to quarter, for example, it would not be possible to “set a handful of target prices” with any realistic expectation that “all participants would understand the implications for prices of other related CRTs.”
72. The wide variation in CDT quarterly price changes is summarized in Table 6. Table 6 reports the results of pairwise comparisons of quarterly growth rates for every individual CDT product with sufficient data in Dr. Netz's sales database.¹⁰⁴ For each possible pair of CDT products in each quarter I first compare the growth rates of prices. If the difference in growth rates is such that the price of one product changed by 5 percent or more relative to the price of the other product, I flag that combination of products as a combination with a large change in relative prices during that quarter. In contrast, if the change in the relative prices of the two products was less than five percent, I do not flag that combination of products for that quarter. The table reports the percentage of total CDT sales for the particular product in Category 2 that experienced such large changes in relative prices for the entire sample. For example, the first row of the table reports that roughly 34 percent of total CDT sales were accounted for by product pairs for which the growth rates were sufficiently different that relative prices changed from quarter to quarter by more than five percent.

premiums for different sizes of CDTs were typically statistically significant at the 5 percent level. (The test was conducted as follows for the 15-inch vs.14-inch price premium, and the 17-inch vs.15-inch price premium: I estimate hedonic regressions for each pair of adjacent years. I then interact the relevant size dummies with year dummies. I then perform a t-test for the equality of the year-size interaction variables to test whether the size premium is statistically different between adjacent years.) The year to year changes in the size premiums were statistically significant in approximately 67 percent of the cases. See my backup file: “size_premium_yoy_sig_CDT.csv”.

¹⁰³ Netz Merits Rebuttal Report, p. 31.

¹⁰⁴ See my backup file “Price Movements.xlsx”. Detailed notes on the analysis in Table 6 can be found in Appendix C Table 6A.

73. I also calculated the average change in relative prices for all of the product combinations that were flagged as having such large changes in relative prices. For all CDTs combined the average change in relative prices for this group was roughly ten percent per quarter. Given that price differences of 5 percent are viewed as being competitively significant in the CDT industry, these are very substantial changes in relative prices.
74. In addition to analyzing the dispersion of price changes for all CDT's combined, I also report the dispersion among CDTs within a given size category or the dispersion across two different size categories. For example, row 2 of Table 6 presents the results for non-large CDT sizes consisting of sizes up to and including 15 inches. For this category, Table 6 reports that roughly 36% of such CDT sales are accounted for by product pairs for which relative prices change from quarter to quarter by more than 5%. Moreover, for this 36 percent of non-large CDTs that were flagged as having such large changes in relative prices, the average change in relative prices was roughly eleven percent per quarter. Similar statistics are shown for large CDTs and for pairwise comparisons of non-large and large CDTs in Table 6. As expected, the percentage of product pairs with large relative price changes is even larger when comparing products across large and small CDT categories than when comparing to other products in the same category.

Table 6¹⁰⁵**Heterogeneity of CDT Price Movements**

	Category 1	Category 2	Share of Products Pairs in Categories 1 and 2 Whose Relative Price Changed by at Least 5%	Average Relative Price Change for Product Pairs in Categories 1 and 2 Whose Relative Price Changed by at Least 5%
Differences Within Categories	CDT	CDT	34%	10%
	Non-large CDT	Non-large CDT	36%	11%
	Large CDT	Large CDT	29%	10%
Differences Across Categories	Non-large CDT	Large CDT	39%	10%
	Large CDT	Non-large CDT	39%	11%

Source: Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba

75. The differentiated market forces affecting individual CDT products and leading to wide variation in quarter to quarter changes in prices can also be seen in Figure 4A. This chart also illustrates that such

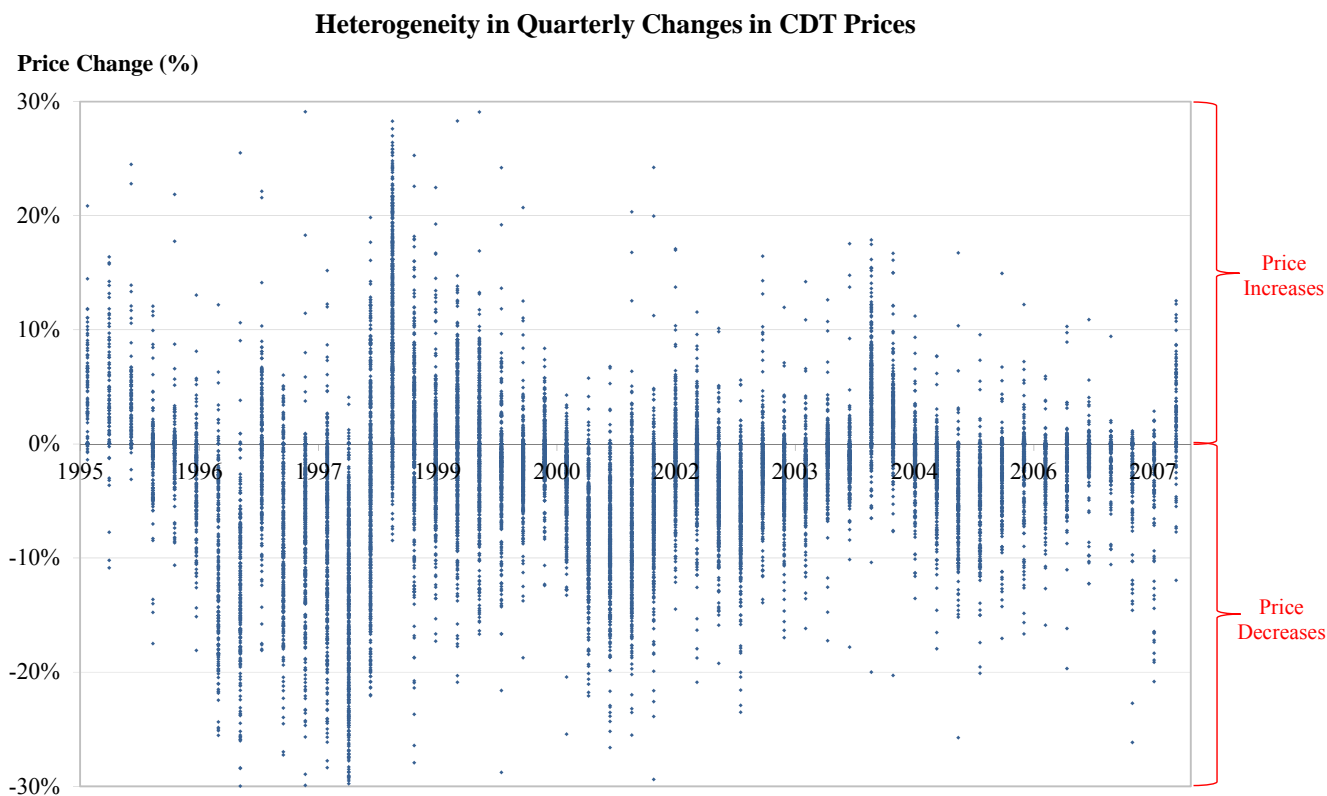
¹⁰⁵ See my backup file "Price Movements.xlsx".

wide dispersion in quarterly price changes continued throughout the alleged conspiracy despite the various changes in the organizational structure and “tactics” of the alleged conspiracy described by Dr. Netz in her reports.¹⁰⁶ Dr. Netz also has previously raised the possibility that many of the price changes that are observed in dollar prices may primarily reflect exchange rate movements rather than changes in prices in the negotiated currency.¹⁰⁷ However, in an average quarter, 78.5 percent of quarterly prices for CDTs changed by at least 1 percent even in the currency in which the prices were negotiated (using CDT sales quantities as weights).¹⁰⁸

¹⁰⁶ The variation in quarterly CDT price changes remains very substantial even if I weight the data by sales volume. On average, the 90th percentile of the sales-volume-weighted distribution of CDT price changes in a given quarter was 4.36 percentage points higher than the weighted average CDT price change for that quarter, and the 10th percentile of the distribution was 4.75 percentage points below the average price. Put differently, on average, the 90th percentile of the sales-volume-weighted distribution of CDT price changes in a given quarter was roughly 9.12 percentage points above the 10th percentile. (See my backup file “Quarterly Price Heterogeneity Figures.xlsx”)

¹⁰⁷ See, e.g. Netz Class Cert Rebuttal Report at pp. 15-18.

¹⁰⁸ See my backup file “Percent of Negotiated Currency Prices with Change of at Least 1%.xlsx”. Appendix C, Figure 4B shows the wide dispersion in quarter-to-quarter CDT price changes for the 78.5 percent of sales in which the negotiated currency price was adjusted by at least 1 percent. The variation in quarterly CDT price changes also remains very substantial even if I weight the data by sales volume. On average, the 90th percentile of the sales-volume-weighted distribution of CDT price changes in a given quarter was 4.57 percentage points higher than the weighted average CDT price change for that quarter, and the 10th percentile of the distribution was 5.01 percentage points below the average price. In other words, on average, the 90th percentile of the sales-volume-weighted distribution of CDT price changes in a given quarter was roughly 9.58 percentage points above the 10th percentile. See my backup file “Quarterly Price Heterogeneity Figures (1%).xlsx”.

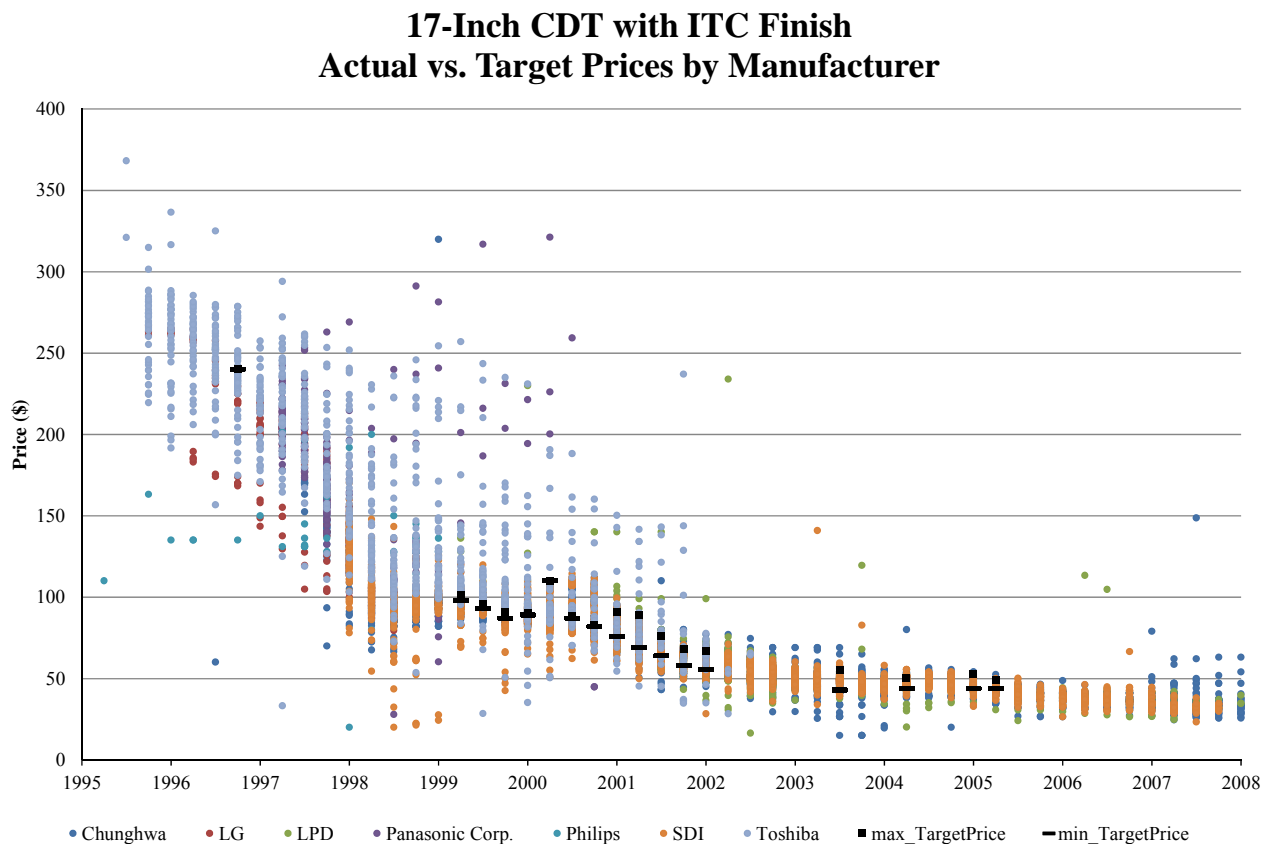
Figure 4A¹⁰⁹

Source: Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba

76. In addition to the variation in price changes from quarter to quarter, Dr. Netz's price structure theory also is undermined by the substantial variation in price levels at each point in time. In particular, the fact that the variation in actual CDT prices is much larger than the contemporaneous variation in CDT target prices as illustrated in Figures 5A-D. This implies that the “common understanding” of price differentials for different sizes, types, manufacturers and customers of CDTs would have had to have been very extensive and complex as well as changing over time.¹¹⁰

¹⁰⁹ See my backup file “Heterogeneity in Quarterly Price Changes.xlsx”.

¹¹⁰ Figure 5A is similar to Figure 17 that I presented in my initial report. The primary difference is that this figure is based on less aggregated data for both target prices and actual prices to illustrate that my conclusions are not sensitive to the level of data aggregation. See my backup files “rebuttal_p010_p101_target_price_regressions.do - actual v target - max min.xlsx”. My Appendix C contains Figures 5B-D for 14, 15, and 19 inch CDTs that are similar to Guerin-Calvert Report Figures 15-16 and 18, respectively.

Figure 5A¹¹¹

Note(s): Dr. Netz's sales database inappropriately labels Panasonic Corp. as MTPD. Actual prices aggregated by maker, size, customer, model, and finish.
 Data source(s): Defendant data; see Expert Report of Janet S. Netz, April 15, 2014, Exhibit 64.
 Cartel meeting notes; see Target price-structure.xlsx.
 Source file(s): PriceTracker.dta; all_defendants_dropexout_collapsed.dta; rebuttal_p010_p101_target_price_regressions.do - actual v target - max min.do

C. Other arguments that Dr. Netz makes in support of her price structure overcharge theory also are incorrect.

77. Dr. Netz also seeks to support her price structure theory with the economic argument that “The cartel had the incentive and ability to raise the price for all CRTs”¹¹² and that “It does not make sense for the cartel to raise the price of some CPTs or CDTs but not others.”¹¹³ While it may be the case that the alleged cartel would have economic incentives to raise the price for all types of CRTs, it does not follow from economic logic or common sense that they would necessarily have had the ability to raise all prices by similar amounts. There are many economic factors indicating that the effect of the alleged conspiracy likely would be significantly different for different sizes of CDTs. The identities of the manufacturers were significantly different. As I noted in my initial report, Japanese-based manufacturers held

¹¹¹ See my backup file “rebuttal_p010_p101_target_price_regressions.do - actual v target - max min.xlsx”.

¹¹² Netz Merits Rebuttal Report, p. 32.

¹¹³ Netz Merits Rebuttal Report, p. 9, 29-30.

substantially greater shares of the larger sizes of CDT, particularly during the early years of the alleged conspiracy.¹¹⁴ According to Dr. Netz's own data, the Japanese-based manufacturers attended a substantially lower fraction of the cartel meetings identified by Dr. Netz¹¹⁵ and rarely appear in Dr. Netz's alleged examples of output and capacity restrictions.¹¹⁶ Similarly, Dr. Netz recognizes that Japanese-based manufacturers may have followed different business strategies from those of other defendants.¹¹⁷

78. In addition, the dynamics of supply and demand forces were in many cases substantially different across different sizes of CDTs. For example, Figure 14 of my initial report showed that growth rates of demand were much higher for the larger sizes of CDTs than those of smaller CDTs, particularly during the early part of the alleged conspiracy. Such differences likely would have required different types of coordination for these larger sizes of CDTs where demand and capacity were growing much more rapidly. These differences in supply and demand factors also led to substantially different price behavior over time as shown by my hedonic regressions and other analysis.¹¹⁸ Such diversity of manufacturers, strategies and supply and demand conditions would have complicated collusion efforts across different sizes and types of CDTs. Moreover, as I demonstrated in section II.B. above, econometric analysis of overcharges using Dr. Netz's own model does not support a conclusion that overcharges were the same or similar across all sizes of CDTs.

79. Dr. Netz also argues that I have overstated the extent of CDT price variation by treating certain CDT characteristics such as ITC and the identity of the customer variations as “attributes meaningful for distinguishing one model of CDT from another.”¹¹⁹ Her discussion appears to be conflating two different analyses – Figure 10 in my initial report which presented a count of unique model numbers in Dr. Netz's dataset, and a related analysis of the degree of price variation in the same data set that I reported in my Appendix C. For my analysis in Appendix C, I reported in a footnote that I used “data that was aggregated to the level of CDT size, finish, manufacturer, model number and customer.”¹²⁰ Dr. Netz appears to have interpreted this footnote to mean that for purposes of my Figure 10, I counted instances in which the same model number was sold to different customers as separate models. If this is her claim, it is incorrect. To be clear, in my Figure 10 I simply reported a count of the number of unique model numbers appearing in the sales data. If the same model number was sold to multiple customers in a given quarter, it only appears once for that quarter in this exhibit, not once for each customer. However, for the purpose of calculating price variation for Appendix C, I do treat instances of the same model number being sold to different customers as different observations. For this analysis, this was an appropriate level of aggregation. To the extent that variation based on model number and customer do not contribute meaningfully to overall CDT price variation, that would be reflected in the statistics that I used to measure variation in my analysis.

¹¹⁴ Guerin-Calvert Report, ¶¶39-41.

¹¹⁵ See, e.g., Netz Merits Report, Exhibit 27.

¹¹⁶ See, e.g., Netz Merits Report, Exhibit 28.

¹¹⁷ See, e.g., Netz Merits Rebuttal Report, pp. 50-51. See also Netz Merits Rebuttal Deposition, pp. 69-70.

¹¹⁸ See, e.g., Guerin-Calvert Report, ¶84 and Figures 13 and 15-18.

¹¹⁹ Netz Merits Rebuttal Report, p. 25.

¹²⁰ Guerin-Calvert Report, footnote 63.

V. TARGET PRICES AND ACTUAL PRICES

A. Dr. Netz overstates CDT Target Price coverage.

80. In my initial report, I pointed out that a large fraction of CDT sales was not covered by target prices even based on Dr. Netz's own analysis for matching actual CDT sales to target prices. Dr. Netz asserts that 39 percent of CDT sales during the class period were associated with a target price.¹²¹ Thus, even based on her own methodology and calculations, Dr. Netz recognizes that she has not identified target prices for a majority of global CDT sales during the alleged conspiracy. I also noted in my initial report that Dr. Netz's target price coverage is particularly low in the 1995-1996 period, even though these years are driving Dr. Netz's estimated overcharges. Even combining all sizes of CDTs together, there are no target prices in Dr. Netz's database until the second quarter of 1996, and the coverage for 1996 is far lower than in later years.¹²² I also pointed out that Dr. Netz had overstated the extent of target price coverage for a number of reasons. For example, she treated any target price that was effective for any portion of a calendar quarter as if it was effective for the entire calendar quarter. I also reported the reduction in target price coverage that results if we assume that the target price is only in effect for the particular month or months specified in Dr. Netz's database. In her rebuttal report, Dr. Netz argued that this adjustment to her calculations was inappropriate because she argues that "target prices were generally determined quarterly and the terms of actual sale prices were typically negotiated quarterly."¹²³

81. I do not find Dr. Netz's arguments or analysis on this issue to be convincing. I find little empirical support for her argument that CDT "target prices were generally determined quarterly."¹²⁴ In particular, Dr. Netz's target price database classifies all CDT target price observations as having either an "effective quarter" or an "effective month," but not both. For CDTs, the vast majority of the target price observations (1,832 of 1,846 or 99.2 percent of all observations) are classified by Dr. Netz as having an "effective month," but not an "effective quarter."¹²⁵ Based on my review of the underlying documents cited by Dr. Netz for many of these CDT target price observations, this determination reflects the fact that these documents typically only report a particular calendar month for which the alleged target price is to become effective. It is much less common for the documents to refer to a calendar quarter in the context of when the price is to be effective, and they almost never specify that the target price is to be effective for an entire calendar quarter.¹²⁶ In general, the most common situation is that the document provides a calendar month in which the target price is to become effective and provides no additional information with respect to how long the target price is meant to be effective for.¹²⁷ Accordingly, these documents

¹²¹ Netz Merits Report, at p. 63.

¹²² The target price coverage calculations are provided in my Guerin-Calvert Report backup file "CDT Target Price Coverage by Quarter.xlsx".

¹²³ Netz Merits Rebuttal Report, p. 10.

¹²⁴ Netz Merits Rebuttal Report, p. 10.

¹²⁵ See my backup file "Target Price Distribution by Effective Month (Before Date Filters).xlsx". In contrast, for CPTs the large majority of the target prices in Dr. Netz's database have an "effective quarter" not an "effective month."

¹²⁶ See my backup file "Effective Month Documents.xlsx".

¹²⁷ Dr. Netz also cites 68 documents in her Exhibit RR-89 to support her assumption of quarterly pricing, but the vast majority of these appear to relate to CPTs, not CDTs. Similarly, all (or virtually all) of the documents in Dr. Netz's Merits Rebuttal Report footnote 23 appear to relate to CPTs, not CDTs. This is consistent with the fact that for CPTs (in contrast to

provide no support for Dr. Netz's assumption that CDT target prices were typically meant to be effective for an entire calendar quarter.¹²⁸

CDTs) the large majority of the target prices in Dr. Netz's database have an "effective quarter" not an "effective month." Dr. Netz also fails to report certain deposition testimony indicating that CDT prices were sometimes changed on a more frequent basis than quarterly. Some examples include the following:

- **SDI's JY Youn:** Q. Did you negotiate prices with Acer on a quarterly basis? A. Well, the Taiwanese companies were crazy in that way. Because usually the negotiation was done quarterly in earlier days. However, the prices were negotiated monthly basis, and then when the market went down, the prices were negotiated for every purchase order. And sometimes even after the purchase order was made, the price was sometimes renegotiated when the LC was being opened, and yet again, it was renegotiated before the goods were being shipped. 12 September 2013, Deposition of Jun Yeol Youn, Volume 2, at 243:4-15.
- **SDI's JI Lee:** Upon arriving at a price term with a customer, would SDI typically agree to hold that price stable for a certain period of time, whether it be three months or six months or some other period? MR. SCARBOROUGH: Overbroad. Vague and ambiguous. Compound. Foundation. Speculation. THE WITNESS: It's difficult for me to remember exactly, but I think it was the case sometimes, but sometimes it was otherwise. BY MR. GRALEWSKI: Q. So, Mr. Lee, to the extent you recall, when it was the case, do you recall what that period of time would be? Would it be -- or could it be three months, could it be six months? What do you recall about that? MR. SCARBOROUGH: Same objections. THE WITNESS: It's difficult for me to remember in details, but I believe it depended on the time frame, whether it was hot season or slow season. Because sometimes it was a month. But I do recall where we had the price negotiation every 15 days. 26 July 2013, Deposition of Jae In Lee, Volume 3, at 393:13-394:8.
- **SDI's H Choi:** Q. Well, isn't it, on the face of this document, clear that if you're talking about what prices would be in May and it's only May 6th, you're talking about prices that would be charged in the future? Isn't that, in fact, what happened at this meeting, sir? MR. SCARBOROUGH: Argumentative. Mischaracterizes the document. Lacks foundation and vague and ambiguous. THE WITNESS: I don't think that it's necessarily true, because sometimes the prices are set on the same month, sometimes the previous month, sometimes like two months before. 19 June 2013, Deposition of Hoon Choi, Volume 1, at 158:14:159:2.

¹²⁸ Lastly, there appear to be many examples in Dr. Netz's own target price database in which CDT target prices are allegedly set on a more frequent basis than quarterly. Examples include CHU00028740E - CHU00028741E, at 8743E-8742E; CHU00028752E - CHU00028754E, at 8752.01E; CHU00028283E - CHU00028285E, at 8284E; and CHU00031249E - CHU00031252E, at 1249.01E - 1250E.

Table 7¹²⁹**The Vast Majority of Dr. Netz's CDT Target Price Observations Have an
"Effective Month" Not an "Effective Quarter"****CDT Target Price Distribution**

	Observations	Percent
Effective Quarter	14	0.8%
Effective Month	1,832	99.2%
Total	1,846	100.0%

Note(s): Limited to "explicit" and "probable" target price agreements.

Does not exclude observations based on Dr. Netz's date filters.

Data Source(s): Defendant data; see Expert Report of Janet S. Netz April 15, 2014, Exhibit 1.

Source File(s): PriceTracker.do; clean_target.do

82. This conclusion also is supported by the fact that the month the target price is specified to become effective frequently is not even the first month of a calendar quarter. For example, Table 8 shows that almost 50 percent of the observations had an effective month of the second or third month in a quarter. (51.6 percent of the observations specified that the effective month for the target price was the first month of the corresponding calendar quarter and 48.4 percent of the observations specified an effective month of either the second month or the third month of the calendar quarter.) Accordingly, despite the fact that her own data indicates that almost half of her alleged CDT target prices were not effective until the second or third month of the calendar quarter, Dr. Netz inappropriately assumes that they were effective for the entire calendar quarter in which they occurred.

¹²⁹ See my backup file "Target Price Distribution by Effective Month (Before Date Filters).xlsx".

Table 8¹³⁰**Many of Dr. Netz's CDT Target Price Observations Have an Effective Month That Is Different from the First Month of the Corresponding Calendar Quarter****CDT Target Price Distribution
For Targets Indicating an Effective Month**

	Observations	Percent
1st Month of Qtr	946	51.6%
2nd Month of Qtr	631	34.4%
3rd Month of Qtr	255	13.9%
Total	1,832	100.0%

Note(s): Limited to "explicit" and "probable" target price agreements.

Does not exclude observations based on Dr. Netz's date filters.

Data Source(s): Defendant data; see Expert Report of Janet S. Netz April 15, 2014, Exhibit 1.

Source File(s): PriceTracker.do; clean_target.do

83. In addition to pointing out that Dr. Netz overestimated target price coverage by assuming that all target prices were effective for an entire calendar quarter, I also explained in my initial report that she overstated coverage for at least two other reasons. For example, if the meeting notes did not specify the particular manufacturers that a target price was meant to apply to, Dr. Netz often assumed that the target price applied to all defendants, including defendants who did not attend the meeting and in many cases defendants for which there was no evidence that they agreed in any way to that alleged target price. In response Dr. Netz identified some examples where manufacturers who did attend particular meetings may have provided information to other manufacturers that did not attend those meetings. However, the fact that such communications may have occurred on occasion does not justify a “default” assumption that all manufacturers agreed to all of these target prices.

84. Dr. Netz also shows that my attempt to correct her coverage ratio for the fact that she does not take into account the shape of the CDT has a relatively small quantitative impact on her reported coverage. However, this is primarily due to lack of data and does not necessarily demonstrate that her procedure does not overstate coverage substantially. Since the vast majority of the CDT sales data do not report shape, my statement of the concept of over-inclusion of sales in her estimated coverage ratio remains valid even though my attempt to correct Dr. Netz's failure to take shape into account has a small quantitative impact on her data. If data on CDT shape and other characteristics were available, the reduction in Dr. Netz's coverage estimate likely would have been substantially larger.

¹³⁰ See my backup file “Target Price Distribution by Effective Month (Before Date Filters).xlsx”.

85. Based on the foregoing discussion, it remains my opinion that Dr. Netz's analysis of target price coverage substantially overstates coverage. This is the case even if I make just some of the adjustments I described in my initial report. To describe this point in more detail, it is informative to break down the effect of adjustments that I made to Dr. Netz's methodology with respect to determining the effective period for target prices into two separate components. The first component consists of Dr. Netz's assumption that a given target price can be assumed to be effective starting with the first day of the calendar quarter in which it becomes effective. For example, if the underlying document that Dr. Netz relies on for a given target price indicates that the price became effective on March 1, 1999, she assumes that it was effective for all sales during the entire first quarter from January 1, 1999 through March 31, 1999. The fact that she assumes the target price is effective for the period prior to the date on which the target price actually becomes effective based on her own data (i.e. the period from January 1, 1999 through February 28, 1999 in the example above) can be called the "retroactive" component of Dr. Netz's methodology, and I believe it is incorrect for the reasons discussed above. Rather than assuming that target prices always come into effect on the first day of a calendar quarter, which is inconsistent with the underlying documents in many cases, I make the correction for coverage estimates by assuming the target price becomes effective on the date that the underlying document specifies.
86. The second component of Dr. Netz's methodology relates to the question of once a target price becomes effective, how long should it be assumed to remain in effect? Dr. Netz's assumption is that the target price always remains in effect until the end of the corresponding calendar quarter, regardless of the particular date in the quarter that it first became effective. For example, whether the underlying document indicated that the target price first became effective on January 1, February 1 or March 1, all of these target prices would be assumed to remain in effect until the end of March. I call this second component the "duration" component of Dr. Netz's methodology. In contrast to Dr. Netz's assumption that all target prices remain in effect until the end of a calendar quarter, the alternative calculation I presented in my initial report assumed that all target prices which Dr. Netz classified as "effective month" target prices only remained in effect for the month that they first became effective. As discussed above, because the underlying documents rarely specified the duration of a CDT target price, I believe this methodology provides a reasonable alternative to Dr. Netz's assumption.¹³¹ The simple fact is, in the vast majority of cases the underlying documents do not appear to specify what the intended duration actually was.¹³²
87. In order to determine the relative importance of these two components, the retroactive component and the duration component, I have made an alternative calculation in which I adjust for the retroactive component of Dr. Netz's methodology, alone. In other words, I maintain her assumption that target prices always remain effective until the end of the corresponding calendar quarter. Accordingly, this

¹³¹ Some of these documents do seem to suggest that the target price was only intended to be in effect for a single month, but many are ambiguous. See, e.g., CHU00017037; CHU00020661E; CHU00028668; and CHU00028670.

¹³² When I was questioned in my deposition about my target price coverage calculations, I did not clearly distinguish between these two components of Dr. Netz's methodology, the retroactive component and the duration component. My discussion may have left the impression that I implemented a methodology for the duration component that did something other than assume that the target price is in effect only for the month that it was first intended to go into effect. In fact, as described herein, I did assume that the target price was only in effect for the month it was first intended to go into effect. See deposition of Margaret Guerin-Calvert, September 17, 2014, pp. 154-157.

methodology is equivalent to assuming that “effective month” target prices are always effective from the date that they first become effective according to the underlying documents until the end of the corresponding calendar quarter. When I incorporate this assumption into the matching methodology, as well as the corrections that I previously made for manufacturers that did not attend alleged target price meetings, and for Dr. Netz’s failure to take CDT shape into account, the adjusted coverage percentage becomes 28.4 percent.¹³³ This represents a substantial reduction in Dr. Netz’s estimate of coverage, and likely overstates coverage for the reasons stated above.

B. Differences between actual and target prices are consistent with an ineffective alleged conspiracy.

88. In my initial report I reported that quarterly changes in target prices did not have a strong predictive relationship on contemporaneous changes in actual CDT prices. I demonstrated this lack of a strong relationship both graphically and with regression analyses. In her rebuttal report, Dr. Netz argues that I misinterpreted the results of my own analysis. She states: “Even if their results were correct (they are not, because they improperly used first-differences in the regressions), the results indicate that the cartel successfully raised price by about 20-25% of its goal. Prof. Willig’s and Ms. Guerin-Calvert’s regressions, even taken at face value, prove exactly the opposite of the point they claim.”¹³⁴
89. Dr. Netz’s interpretation of my regressions and graphical analysis is incorrect. She appears to assume that I claimed there was no relationship between actual and target prices; but I did not claim this. Rather, I showed that the relationship was a modest one, with substantial evidence of non-adherence. Moreover, I concluded that Dr. Netz’s analysis tended to substantially overstate the actual relationship. To illustrate the problem with Dr. Netz’s interpretation of my analysis, consider a simple example in which the alleged cartel sought to raise the price by ten percent during a particular quarter. Assume further that in the absence of the cartel the price would still have increased by 2.5 percent due to other market factors. In this case, merely observing that an actual price increase of 2.5 percent coincided with a ten percent increase in the target price does not support a conclusion “that the cartel successfully raised price by about 20-25% of its goal.”¹³⁵ In fact, the cartel in this example was completely unsuccessful in raising prices by more than they would have increased by otherwise.
90. Dr. Netz’s interpretation of analysis of the relationship between actual and target CDT prices also fails to take account of the substantial *variation* in the observed changes in actual CDT prices for a given change in target prices across manufacturers, products, and time periods. As I discussed in my initial report, in addition to the average response to a change in target price as summarized by the coefficient on the variable representing the change in target prices from quarter to quarter, I find the high degree of variation in responses across manufacturers, products, and time periods to be very informative for showing the lack of adherence to alleged target prices as well. The high degree of variation in the response of CDT manufacturers was illustrated in my initial report by the relatively low R-squared statistics in my

¹³³ See my backup file “CDT Target Price Coverage (Alternative Method).xlsx”.

¹³⁴ Netz Merits Rebuttal Report, p. 43.

¹³⁵ Netz Merits Rebuttal Report, p. 43.

regressions, as well as the substantial variation of the data points in my scatterplots (See my initial report ¶¶73-77). To the extent that CDT manufacturers were successfully coordinating on certain levels or changes in target prices during the alleged cartel, I would not expect to see such wide variation in actual price changes for a given change in target prices. This high level of variation in manufacturer pricing decisions provides additional economic evidence against the effectiveness of the alleged conspiracy.

91. I also demonstrated that for the majority of CDT sales for which Dr. Netz was not even able to assign a target price, the statistical relationship was even weaker.¹³⁶ Dr. Netz's conclusions about the relationship between actual prices and target prices also is undermined by the fact that such a high fraction of sales occurred at prices that were below target prices. As I reported in my initial report, the evidence shows that approximately 80 percent of CDT sales for which Dr. Netz identified a target price were sold below that target price.¹³⁷ Moreover, widespread pricing below target prices continued throughout the alleged conspiracy. For example, Table 3 in my initial report shows that the large majority of sales remained below target prices even during 2003-2005. Accordingly, there is no evidence that the alleged conspiracy was able to increase adherence substantially over time.
92. Dr. Netz argues that the regression approach that I used based on first differences in actual and target prices is inappropriate because it is unduly influenced by “noise” in the actual and target price data.¹³⁸ However, she makes no attempt to empirically establish that such “noise” actually has any significant effect on my empirical analysis. She also ignores the fact that I have taken a number of steps to mitigate possible effects of any such “data noise” in my analysis. First, I calculate the actual prices used in my analysis at a more disaggregated level than Dr. Netz. In particular, the prices were calculated using data that was aggregated to the level of CDT size, finish, manufacturer, model number, factory, and customer, whereas Dr. Netz's data is more aggregated at the level of CDT size, finish, manufacturer, factory, and customer. Accordingly, Dr. Netz's claim that the actual prices I use would reflect noise due to “lack of complete information on CRT characteristics” and “changes in the mix of CRTs over time” is incorrect.¹³⁹ Since the prices I use are calculated at the level of individual model numbers and each model number reflects a particular and unchanging set of CDT characteristics, the quarterly price changes I use should not be distorted by changes in the mix of CRTs over time. In addition, I used two different filters to screen out “outlier” observations in the price data: the filters employed by Dr. Netz in constructing her data set, and an additional filter described in my initial report.¹⁴⁰
93. As an additional check on my analysis, I have also run the analyses reported in Appendix F of my initial report on a much smaller sample of data comprised of all observations for which I was able to identify the shape of the CDT (curved or flat) for both the actual prices and target prices. This data set matches actual and target price changes based on all three of the characteristics that Dr. Netz considers to be the key drivers of CDT prices: size, shape and finish, further reducing potential “composition effects” that

¹³⁶ See Guerin-Calvert Report, ¶¶76-77.

¹³⁷ See Guerin-Calvert Report, ¶70.

¹³⁸ Netz Merits Rebuttal Report, pp. 45-46.

¹³⁹ Netz Merits Rebuttal Report, footnote 200.

¹⁴⁰ See note 4 to Appendix F in my initial report.

Dr. Netz argues could be affecting the results of my first difference regressions. Because data on CDT shape typically are not available, the resulting data set only has approximately 8.5 percent of the data from the original data set. As shown in Table 9, the estimated coefficient on the change in target prices for the basic model with no additional variables added increases from the 0.237 that I reported in my original report to around 0.424. However, when I add in the macroeconomic variables used by Dr. Netz, the coefficient on the change in target price declines very substantially, with the point estimate actually becoming negative at -0.0703. The R-squared statistic increases by a small amount from 0.126 in my initial report to about 0.162 for the model with no additional variables added. Accordingly, this model is consistent with the results I reported in my initial report that the change in target prices explains a very small fraction of the total variation in quarterly changes in actual prices. While the R-squared statistic increases to 0.469 for the model which includes the macroeconomic variables, this simply reflects the fact that the macroeconomic variables have significant explanatory power for the changes in actual prices, not the target price variable. In addition, as I reported in my initial report, the evidence shows that approximately 80 percent of CDT sales for which Dr. Netz identified a target price were sold below that target price.¹⁴¹ In sum, I find that all of these results are fully consistent with the conclusions I reached in my initial report -- there is substantial economic evidence that the defendant manufacturers did not adhere closely to target prices in their actual pricing of CDTs.

Table 9¹⁴²

Row	Dependent Variable	Independent Variables			Prices Not Matched Based on Shape			Prices Matched Based on Shape		
	Change in Actual Price (Level of Aggregation)	Change in Alleged Target Price (Level of Aggregation)	Change in Macroeconomic Variables	Change in Negotiated Price Currency-to-USD Exchange Rate Variables	Number of Observations	Estimated Coefficient on Change in Target Price	R-Squared	Number of Observations	Estimated Coefficient on Change in Target Price	R-Squared
1	Model, Customer, Factory, Quarter	Manufacturer, Application, Size, Finish, Shape (where applicable), Quarter			6,225	0.237***	0.126	528	0.424***	0.162
2	Model, Customer, Factory, Currency, Quarter	Manufacturer, Application, Size, Finish, Shape (where applicable), Quarter	X	X	6,116	0.215***	0.226	487	-0.0703	0.469

Sources:

(1) Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic Corporation, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba Corp.; (2) Netz target price data; (3) OECD StatExtracts Database (OECD unemployment rate and industrial production), Bank of Korea (Korean CRT glass PPI), DisplaySearch (worldwide monitor sales by technology), U.S. Federal Reserve (exchange rates).

94. Dr. Netz also mischaracterizes some of my criticisms of her target price analysis. For example, she states: “According to Ms. Guerin-Calvert, when Defendants actually sold CDTs over the following months, the only reason those prices were correlated with the target prices was because the cartel was good at forecasting what prices would be.”¹⁴³ In contrast to Dr. Netz’s claims, I did not argue that this was “the only reason those prices were correlated with the target prices.” In fact I discussed at length at least three

¹⁴¹ See Guerin-Calvert Report, ¶70.

¹⁴² See my backup file “CDT Regressions of Changes in Actual Prices on Changes in Target Prices.xlsx”. More detailed notes for Table 9 can be found in Appendix C, Table 9A.

¹⁴³ Netz Merits Rebuttal Report, p. 47.

reasons for such a correlation: 1) spurious correlation due to the fact that actual prices and target prices are influenced by the same supply and demand factors, many of which are not included in Dr. Netz's model;¹⁴⁴ 2) reverse causation due to the fact that target prices are often based on contemporaneous actual prices;¹⁴⁵ and 3) the fact that target prices may reflect to some extent manufacturers expectations about how supply and demand conditions for CDTs may unfold over the coming weeks and months.¹⁴⁶

95. To illustrate this third factor, I provided an example in which there could exist a strong correlation between macroeconomic forecasts and subsequent changes in GDP, even though the forecast was not causing the subsequent changes in GDP. Dr. Netz dismissed this third factor based on her argument that my example was irrelevant because the defendants had the ability to influence future CDT prices whereas a macroeconomic forecaster presumably had no ability to influence future GDP. This argument demonstrates a misunderstanding of my point. My point had nothing to do with whether or not the manufacturers influence actual prices. My point was simply that spurious correlation could exist, even in a situation where the target price had no actual causal impact on future actual prices. Accordingly, observing such a correlation does not allow one to conclude that it reflects a strong causal relationship as Dr. Netz does. Similarly, whether target prices had some causal impact or not, the spurious correlation problem likely would cause Dr. Netz's model to overstate any such causal effect.
96. In her rebuttal report, Dr. Netz recognizes that "some CRTs have higher target and actual prices because they are bigger or higher quality, and that this might cause an improperly specified regression to find a relationship between target and actual prices where one did not exist."¹⁴⁷ She argues that she has avoided this problem by using a "fixed effects estimator."¹⁴⁸ In particular, Dr. Netz includes fixed effects in her regression model for customer, manufacturer, size and finish.¹⁴⁹ However, it is unlikely that Dr. Netz's fixed effects variables are sufficient to eliminate this type of spurious correlation problem. For example, if the relationship between the fixed effects variables and the prices are changing over time, or if there are additional unobservable CDT characteristics that affect both actual and target prices and for which there is no data, using fixed effects on the observable variables will not necessarily eliminate this problem.¹⁵⁰ For example, flat CDTs or CDTs with higher resolution typically have higher prices than curved CDTs (other things equal). However, we usually cannot observe the shape or the resolution of particular CDTs in the data. Accordingly, even when Dr. Netz uses fixed effects for the observable characteristics, she likely will still have a spurious positive correlation because she does not typically observe shape, resolution or other characteristics.

¹⁴⁴ Guerin-Calvert Report, at ¶79.

¹⁴⁵ Guerin-Calvert Report, at ¶80.

¹⁴⁶ Guerin-Calvert Report, at ¶81.

¹⁴⁷ Netz Merits Rebuttal Report, pp. 44-45.

¹⁴⁸ Netz Merits Rebuttal Report, footnotes 194, 203.

¹⁴⁹ Netz Merits Report, Exhibit 37: "Fixed Effects by customer, manufacturer, size, and finish".

¹⁵⁰ For example, I demonstrated in my initial report that the price differentials between different sizes of CDTs varied significantly over time rather than keeping a constant relationship as "fixed effects" would assume. Guerin-Calvert Report, ¶84.

97. Similarly, Dr. Netz appears to recognize that spurious correlation may arise “because target and actual prices are affected by the same market forces that caused prices to generally trend downward over time.”¹⁵¹ However, she argues that she controls for such problems by including variables for the cost of glass and two macroeconomic factors (overall industrial production and the unemployment rate in the OECD).¹⁵² However, CDT prices obviously were determined by a much more extensive and complex set of supply and demand factors than these three macroeconomic variables, including many industry and manufacturer specific factors during the alleged conspiracy period.
98. Dr. Netz appears to argue that her regression approach which uses levels of prices rather than first differences and includes a lagged value of the actual price as an additional explanatory variable is unambiguously superior to my first difference approach as a matter of economics and econometrics. I disagree with this conclusion. As noted in my initial report and above, using price levels can result in spurious correlation between actual and target prices for numerous reasons. This spurious correlation between actual and target prices is mitigated in my analysis of quarter to quarter changes because there are fewer changes in the omitted variables that can affect both actual and target prices over shorter time horizons, and because the changes in these variables are not as large as they would be over a longer time period. While including a lagged dependent variable can reduce such spurious correlation problems in certain circumstances, it does not necessarily eliminate them.
99. I also note that Dr. Netz’s regression output indicates that the macroeconomic variables selected by Dr. Netz leave a substantial portion of the time series variation in CDT prices unexplained. In particular, the regression output decomposes the total variation in prices into that portion which can be explained using the fixed effects in the model such as manufacturer, size, customer and finish, versus the time series variation in prices that occurs within these groups over time. The output for Dr. Netz’s CDT regression indicates that Dr. Netz’s macroeconomic variables, her lagged actual price variable and her target price variable explain about 78.7 percent of the “within group” time series variation in actual CDT prices of targeted CDTs and 62.1 percent of the variation in targeted and non-targeted CDTs.¹⁵³ If we drop the target price variable and re-run Dr. Netz’s regression, we find that Dr. Netz’s macroeconomic variables and her lagged price variable explain about 69.4 percent of the “within group” time series variation in actual CDT prices of targeted CDTs and 58.9 percent of the variation in targeted and non-targeted CDTs.¹⁵⁴ Accordingly, although Dr. Netz does include some macroeconomic variables in her regressions of actual and target price levels, these variables leave a substantial amount of the time series variation in prices unexplained. The economic forces that drive this remaining variation could continue to produce spurious correlation in Dr. Netz’s regressions.
100. Dr. Netz also provides a “simulation” which purports to illustrate the potential effects of data noise on a first difference regression. However, she recognizes the limitations of such a hypothetical “simulation” when she states: “I do not base any of my conclusions on the simulated data nor do I claim that the

¹⁵¹ Netz Merits Rebuttal Report, p. 45.

¹⁵² Netz Merits Rebuttal Report, p. 45.

¹⁵³ See my backup file “cdt_within_group_variation.smcl”.

¹⁵⁴ See my backup file “cdt_within_group_variation.smcl”.

simulated data represent the Defendant data.”¹⁵⁵ Moreover, it is not difficult to imagine a similar “simulation” in which the trend component of actual and target prices reflects spurious correlation due to unobservable demand or cost variables which affect both actual and target prices and are trending down over time. In addition, the smaller quarter to quarter deviations of actual prices from target prices, which might be small in comparison with the long term trend, could reflect non-adherence to target prices, rather than data “noise” as assumed by Dr. Netz. In this case, a first difference approach similar to the one I used would likely be more informative than an analysis based on the levels of prices.

101. In addition, even if there were some causal relationship between the levels of target prices and actual prices as Dr. Netz claims, I showed in my initial report that there remain significant limits on the ability of CDT target prices statistically to predict actual CDT price levels. Even if we confine our analysis to the minority of CDT sales for which Dr. Netz claims to have found target prices, actual prices would have a roughly 66 percent probability of being 10 percent different than the target prices (and an even higher probability (over 82 percent) of being at least 5 percent different than the target price).¹⁵⁶ This high rate of prediction error is consistent with the results on quarterly price changes shown above and indicates that it would be difficult for CDT manufacturers to accurately monitor one another's pricing and adherence to the alleged target prices. Moreover, individual CDT manufacturers would actually have had a much more difficult time than implied by this regression analysis since they would have far less detailed data than that contained in Dr. Netz's price databases and would be attempting to monitor such pricing for many different types of products, competitors and customers in real time.

102. Dr. Netz criticizes this analysis because I did not include other variables beyond target prices that she included in her regression model such as glass costs, industrial production and unemployment. Dr. Netz suggests that these variables should be included to reflect the fact that the alleged cartel members had more current information about market conditions when they set actual prices than when they set target prices.¹⁵⁷ However, if changes in general market conditions such as those reflected by these variables often led to deviations of actual prices from target prices, this is completely consistent with my view that CDT manufacturers took many factors into account when setting prices (including broad trends in cost and demand as proxied by Dr. Netz's variables.) In addition, the point of my analysis was to measure the frequency and magnitude of non-adherence to target prices. It would be far less relevant for analyzing the extent of adherence to target prices to measure the errors in predictions that were based on both target prices and a selected set of cost and macro variables.

¹⁵⁵ Netz Merits Rebuttal Report, p.46.

¹⁵⁶ See my Guerin-Calvert Report backup file “prediction_error_matched_products.csv”.

¹⁵⁷ Netz Merits Rebuttal Report, pp. 47-48.

VI. DR. NETZ INAPPROPRIATELY MINIMIZES SUBSTANTIAL EVIDENCE OF NON-ADHERENCE AND INCORRECTLY ARGUES THAT MY ANALYSIS IS INCONSISTENT WITH RECENT DEVELOPMENTS IN THE ECONOMIC THEORY OF CARTELS.

103. In my initial report, I presented a variety of evidence indicating that the defendant manufacturers' actual conduct deviated substantially from the conduct one would expect in an effective, well-functioning conspiracy. In her rebuttal report, Dr. Netz seeks to minimize much of this evidence and claims that some of my analyses are inconsistent with recent economic literature on cartels.

A. The magnitude and significance of non-adherence to alleged target prices

104. Dr. Netz argues that the fact that "Defendants sometimes set prices below target prices"¹⁵⁸ is fully consistent with her conclusion that Defendants successfully raised prices substantially above competitive levels. She also argues that "the evidence of 'cheating' discussed by Defendants' experts amount to little more than the ordinary, day-to-day functioning of a cartel, in line with what current economic theory and empirical research lead us to expect."¹⁵⁹

105. However, Dr. Netz's characterization that "Defendants sometimes set prices below target prices"¹⁶⁰ misleadingly minimizes the degree of non-adherence to target prices. As I reported in my initial report, the evidence shows that approximately 80 percent of CDT sales for which Dr. Netz identified a target price were sold below that target price.¹⁶¹ Moreover, actual CDT prices were often significantly below the target prices. For example, I estimate that 52.8 percent of CDT unit sales volume in Dr. Netz's own database was more than five percent below the target price assigned by Dr. Netz.¹⁶² I also showed that such pricing below target prices continued throughout the alleged conspiracy period.¹⁶³

¹⁵⁸ Netz Merits Rebuttal Report, p. 42.

¹⁵⁹ Netz Merits Rebuttal Report, p. 40.

¹⁶⁰ Netz Merits Rebuttal Report, p. 42.

¹⁶¹ See Guerin-Calvert Report, ¶70.

¹⁶² See my backup file "Share of Quantity Below the Target Price.xlsx". Produced documents suggest that price differences of five percent or less often were considered to be competitively significant in the CDT industry. See, e.g., CHU00028589 - 8590, at 8590.01E; CHU00028728 - 8729, at 8728.01E and 8729E; CHU00028763 - 8767, at 8763.01E - 8763.02E; CHU00071480 - 1482, at 1481E; CHU00031279 - 1282, at 1280.02E; CHU00030888 - 0893, at 0890.02E. and Deposition of Samsung SDI 30(b)(6) Jaemin Lee, Volume 2, 7 June 2012, at 189:3-6.

¹⁶³ Guerin-Calvert Report, Table 3.

Table 10¹⁶⁴**Share of Quantity Below the Target Price**

Type	Below	2% Below	5% Below
CDT	80.5%	71.5%	52.8%

Percent of Quantity Below the Minimum Potentially Applicable Target Price

Type	Below	2% Below	5% Below
CDT	63.6%	53.5%	36.9%

Percent of Quantity Below Target Price (Matching on Shape)

Type	Below	2% Below	5% Below
CDT	95.2%	89.9%	71.4%

106. I have also performed a number of robustness checks for my analysis of the extent to which actual CDT prices were below target prices. First, I attempted to match CDT sales and the CDT target prices using a greater level of detail than Dr. Netz. While Dr. Netz matched sales based on manufacturer, size, finish, and quarter, I also matched on CDT shape where such information was available. While this resulted in losing a large percentage of the CDT data (roughly 83.1 percent¹⁶⁵), I found that 95.2 percent of the CDT sales quantity for these observations was priced below the alleged target price, and 71.4 percent was priced at least 5 percent below the alleged target price. Second, I attempted to control for the fact that Dr. Netz in some cases averaged multiple target prices together to obtain a single CDT target price observation for a given combination of manufacturer, size, finish, and quarter. As a robustness check, I compared actual CDT prices to the lowest CDT target price she identified for each combination of manufacturer, size, finish, and quarter. Because this approach may frequently compare actual prices of higher quality models with target prices for more basic CDTs, it is biased towards finding a smaller fraction of actual prices below the lowest target price. Despite this bias, I continue to find that 63.6 percent of the worldwide CDT sales for which Dr. Netz identified an alleged applicable target price were priced below the minimum potentially applicable target price, and 36.9 percent of CDTs sold worldwide for which Dr. Netz identified an alleged applicable target price were priced at least 5 percent below that target price. Accordingly, all three approaches to comparing actual and target CDT prices indicate widespread non-adherence to the alleged target prices identified by Dr. Netz.

107. Similarly, I also showed in my initial report that quarterly changes in target prices did a very poor job of predicting quarterly changes in actual prices, even for CDTs for which Dr. Netz claims to have identified a corresponding target price.¹⁶⁶ Moreover, changes in target prices did an even worse job of

¹⁶⁴ See my backup file “Share of Quantity Below the Target Price.xlsx”.

¹⁶⁵ See my backup file “Sales % Lost (Matching on Shape).xlsx”.

¹⁶⁶ Guerin-Calvert Report, ¶75.

predicting changes in actual prices for CDTs for which Dr. Netz was not able to assign a corresponding target price.¹⁶⁷

B. The magnitude and significance of market share changes

108. Similarly, Dr. Netz seeks to dismiss or minimize the evidence of substantial changes in CDT market shares. This is consistent with the fact that she did not even acknowledge the clearly relevant evidence on market share changes in her initial report, despite the fact that she had used such data for other purposes in her report. For example, Dr. Netz argues that economic theory indicates that shifting market shares can be consistent with an effective cartel.¹⁶⁸ She cites an article which states that “the best collusive equilibrium may have market shares moving over time as firms achieve a more efficient mechanism in which a firm with lower cost has a higher market share.”¹⁶⁹ However, while a variety of different market share patterns potentially could be consistent with collusion as a matter of economic theory, I provided evidence from this case supporting the view that the substantial share gains of firms such as SDI were, on balance, a major factor inconsistent with, and that would have acted to undermine the effectiveness of alleged collusion.¹⁷⁰ For example, numerous contemporaneous documents indicate that the defendant manufacturers frequently did not trust one another and believed some firms such as SDI were frequently misrepresenting their actual performance and expanding their share by “cheating” on alleged agreements.¹⁷¹ In contrast, Dr. Netz cites no contemporaneous documents to support the speculative implication that the alleged conspirators in this case might have made a conscious decision to “have market shares moving over time as firms achieve a more efficient mechanism in which a firm with lower cost has a higher market share.”¹⁷²

C. Dr. Netz incorrectly claims that my analysis of cartel non-adherence is inconsistent with “modern economic theory and empirical studies of real world cartels.”

109. Dr. Netz also takes issue with my opinion that I would have expected more evidence of punishment and/or compensation in light of such widespread non-adherence to target prices and substantial market

¹⁶⁷ Guerin-Calvert Report, ¶76.

¹⁶⁸ Netz, Janet S., Ph.D., 15 February 2013, Rebuttal Declaration of Janet S. Netz, Ph.D., In Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, In re: Cathode Ray Tube (CRT) Antitrust Litigation, at 28-30.

¹⁶⁹ Netz Merits Rebuttal Report, footnote 215.

¹⁷⁰ This is consistent with economic literature. One study summarized the literature as follows: “As indicated, the fundamental background reduces to three core issues - product, volatility and company criteria. The first core question is whether the industry has a homogeneous product or not. Cartels are far more likely if the product is fairly homogeneous between companies in the market. Considerable product differentiation has the opposite effect. Second, does the industry display volatile turnover over a sustained period of time? Cartels are more likely if output and market conditions are normally stable. This does not preclude occasional shocks to the market but these are not the norm. Also the lack of volatility does not imply a constant turnover but when there is decline it is likely to be persistent and relatively constant. Finally, are the leading players in the market large and relatively constant? If there are significant changes in market shares or regular exits and entrants then cartels are less likely.” Grout and Sonderegger (2005, at pp. 14-15, emphasis added)

¹⁷¹ See Guerin-Calvert Report, at ¶¶86 and 102-106.

¹⁷² Netz Merits Rebuttal Report, footnote 215, citing Joseph E. Harrington, Jr. (2004, Revised 2005), Detecting Cartels, in *Handbook of Antitrust Economics*, P. Buccirossi, ed., The MIT Press, 2008, p. 42.

share changes. Dr. Netz implies that this opinion of mine is inconsistent with “modern economic theory and empirical studies of real world cartels.”¹⁷³ However, several of the models in the economic literature where market share changes are part of the collusive agreement, as well as many actual cartels that have been studied by economists, involved some form of compensation or side payments among the conspirators as an integral part of the collusive agreement. Some examples are provided below:

- Private Monitoring and Communication in Cartels: Explaining Recent Collusive Practices, Joseph E. Harrington and Andrzej Skrzypacz** “Motivated by recent cartel practices, a stable collusive agreement is characterized when firms’ prices and quantities are private information. Conditions are derived whereby an equilibrium exists in which firms truthfully report their sales and then make transfers within the cartel based on these reports. The properties of this equilibrium fit well with the cartel agreements in a number of markets including citric acid, lysine, and vitamins.”¹⁷⁴ (Emphasis added)
- “There are a number of properties common to the citric acid and lysine cartels that we would like to highlight....Fifth, the collusive agreement was (at least partly) enforced through a transfer scheme whereby firms that reported sales above their quota effectively made a payment (through interfirm purchases) to those firms that reported sales below their quota.”
- “These properties are not unique to the citric acid and lysine cartels. The setting of sales quotas with monitoring in terms of reported sales was also a practice deployed by cartels in the markets for carbonless paper, choline chloride, copper plumbing tubes, graphite electrodes, plasterboard, vitamins, and zinc phosphate. For example, from the European Commission decision on the vitamins cartel: ‘The purpose of the quarterly meetings was to monitor achieved market shares against quota and to adjust sales levels to comply with the agreed allocations.’”
- “Finally, the use of a transfer scheme based upon reported sales was also documented for cartels in choline chloride, organic peroxides, sodium gluconate, sorbates, vitamins, and zinc phosphate.”
- How Do Cartels Operate?, Joseph E. Harrington, Jr.** “Suppose a firm was found to have priced below the agreed-upon price or sold significantly in excess of their sales quota. What was the punishment that would ensue? The review of these cases reveal two types of reactions to apparent violations. For some of the cartels with allocation schemes, they instituted a well-structured compensation scheme whereby either: i) a firm that sold too much had to buy output from a firm that sold too little; or ii) the next year’s sales quotas were adjusted accordingly. A second reaction was to engage in aggressive pricing behavior.”¹⁷⁵ (Emphasis added)

¹⁷³ Netz Merits Rebuttal Report, p. 40.

¹⁷⁴ Joseph E. Harrington and Andrzej Skrzypacz, Private Monitoring and Communication in Cartels: Explaining Recent Collusive Practices American Economic Review 101 (October 2011): 1–25

¹⁷⁵ Harrington, Joseph E., Jr., 2006, “How Do Cartels Operate?”, *Foundations and Trends in Microeconomics*, Vol. 2, No. 1, 1-105, at 57.

- Similarly, the **Levenstein & Suslow** article that Dr. Netz repeatedly cites in this context states that “Successful cartels fashion self-imposed penalties or other compensation schemes for firms that exceed cartel quotas.”¹⁷⁶

110. Accordingly, my analysis is fully consistent with “modern economic theory and empirical studies of real world cartels.”

111. Dr. Netz also argues that some of the large observed changes in market shares may reflect that “various firms had differentiated strategies and sold differentiated products.”¹⁷⁷ In particular she argues that Japanese manufacturers may have focused more on high-end market segments which did not grow as quickly as other segments. However, she makes no attempt to reconcile her argument that such “differentiated strategies and differentiated products” were sufficient to result in very large changes in market share with her contradictory opinions in other parts of her report that “Defendants’ experts exaggerate the degree and impact of product differentiation.”



Margaret E. Guerin-Calvert

November 6, 2014

¹⁷⁶ Levenstein, Margaret C., and Valerie Y. Suslow, “What Determines Cartel Success?” *Journal of Economic Literature*, Vol. 44(1), 43-95, p. 67.

¹⁷⁷ “Defendants’ experts recognize that the various firms had differentiated strategies and sold differentiated products.” Netz Merits Rebuttal Report, p. 50-51. See also Netz Merits Rebuttal Deposition, pp. 69-70.



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| 2008-2012 | Vice Chairman and Senior Managing Director, Compass Lexecon
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| 2003-2008 | President, Competition Policy Associates (As of January 2006, also Senior
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| 1994-2003 | Principal, Economists Incorporated |
| 1990-1994 | Assistant Chief, Economic Regulatory Section, Economic Analysis Group,
Antitrust Division, U.S. Department of Justice |
| 1987-1990 | Senior Economist, Economists Incorporated |
| 1986-1987 | Director of Analytical Resources Unit,
Economic Analysis Group, Antitrust Division |
| 1985-1986 | Economist, Economic Analysis Group,
Antitrust Division, U.S. Department of Justice |

1982-1985 Economist, Financial Structure Section, Division of Research and Statistics,
Board of Governors of the Federal Reserve System

1979-1982 Economist, Economic Policy Office, Antitrust Division, U.S. Department of
Justice

1976-1977 Research Associate, Energy Economics Group, Arthur D. Little, Inc.

TEACHING EXPERIENCE

1984 Adjunct Lecturer, Institute of Policy Sciences, Duke University

1984-1989 Executive Education for Top State Managers, conducted by The Institute of
Policy Sciences, Duke University

1983 Lecturer, Board of Governors of the Federal Reserve System and American
Institute of Banking

1979 Teaching Assistant, Princeton University

TESTIMONY

Investigation into the Competitive Marketing of Air Transportation, CAB

Arbitration Between First Texas Savings Association and Financial Interchange Network

In Re “Apollo” Air Passenger Computer Reservation System (CRS) MDL DKT. No. 760 M-21-
49-MP

U.S. v. Ivaco, Inc.; Canron, Inc.; and Jackson Jordan, Inc.

Consent Order Proceeding before the Competition Tribunal, Canada Between The Director of
Investigation and Research and Air Canada, Air Canada Services, Inc., PWA Corporation,
Canadian Airlines International, and the Gemini Group Automated Distribution Systems Inc.

In the Matter of an Application by the Director of Investigation and Research under Section 79 of
the Competition Act and in the Matter of certain practices by the D & B Companies of Canada
Ltd. (Respondent), before the Competition Tribunal

Beville v. Curry, et al.; Comanche County District Court, Case No. CJ-95-115

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(April 29, 1998)

Easy Gardener, Inc. v. Dalen Products, Inc.

Trigen – Oklahoma City Energy Corporation v. Oklahoma Gas & Electric Company

State of California v. Sutter Health; Alta Bates; and Summit Medical Center

Ernest T. Smith, III et al. v. N. H. Department of Revenue Administration, et al.

St. Luke's Hospital v. California Pacific Medical Center; Sutter Health System

In Re: Cigarette Antitrust Litigation and related cases, *Holiday Wholesale Grocery Co., et al. v. Philip Morris Inc., et al.*, MDL Docket No.: 1342 Civil Action No.: 1:00-cv-0447-JOF and *Artemio Del Serrone, Steven Ren, Heather Snay, Jon Ren, Keith Pine, and Bill Reed, on behalf of themselves and all others similarly situated v. Philip Morris Inc., R.J. Reynolds Tobacco Co., Brown & Williamson Tobacco Corp., Lorillard Tobacco Co., Liggett Group, Inc., and Brooke Group, Ltd.*, Case No. 00-004035 CZ, State of Michigan in the Circuit Court for the County of Wayne

In Re: Vitamin Antitrust Litigation; Misc. No. 99-197 (THF) MDL No. 1285

Economic Report in Response to European Commission's Statement of Objections Dated 22 May 2003

European Commission Hearing, Case No Comp/E-2/37.533-Choline Chloride

Report of Robert D. Willig and Margaret E. Guerin-Calvert to the NZCC *An Economic Analysis of the Consumer Benefits and Competitive Effects of the Proposed Alliance Between Qantas Airways and Air New Zealand*

Report of Robert D. Willig and Margaret E. Guerin-Calvert to the NZCC *An Economic Assessment of Professor Tim Hazledine's Model of the Proposed Alliance Between Qantas and Air New Zealand*

Presentations by Robert D. Willig and Margaret E. Guerin-Calvert to the NZCC *An Economic Analysis of the Consumer Benefits and Competitive Effects of the Proposed Alliance Between Qantas Airways and Air New Zealand; Consumer Benefits*

Erol Riza, M.D. et al., Plaintiffs v. Mercy Health System Physician Hospital Organization, et al, Defendants, Case No. CO199904796/Case NO.CI0200104455

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Comments of Margaret E. Guerin-Calvert, Competition Policy Associates, Inc., Washington, DC on Revision of Regulation (EEC) 2299/89 on a code of conduct for computerized reservation systems (CRS), July 8, 2004

In the Matter of an Appeal from Determinations of the Commerce Commission, Between Air New Zealand Limited and Qantas Airways Limited and Commerce Commission, High Court of New Zealand, CIV 2003 404 6590

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In Re: DRAM Antitrust Litigation, Master File No. M-02-1486PJH, MDL No. 1486, United States District Court, Northern District of California

In Re: Carbon Black Antitrust Litigation, MDL Docket No. 1543, No. 03-CV-10191-DPW (D. Mass.)

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In the Matter of Mechanical and Digital Phonorecord Delivery Rate Adjustment Proceeding, Testimony before the Copyright Royalty Board of the Library of Congress, Washington, DC, Docket No. 2006-3 CRB DPRA

In the matter of *United States v. ASCAP Application of America Online, Inc.; United States v. ASCAP, Application of RealNetworks, Inc. and United States v. ASCAP, Application of Yahoo! Inc.*, United States District Court Southern District of New York, Civil Action No. 41-1395 (WCC). May 4, 2007

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Pharmaceuticals USA, Inc., a Delaware corporation, *Teva Pharmaceutical Industries, Ltd.*, an Israeli corporation, and *Novopharm, Ltd.*, a Canadian Corporation, Counterclaim Plaintiffs, v. *Abbott Laboratories*, an Illinois corporation, *Fournier Industrie et Sante*, a French corporation, and *Laboratoires Fournier, S.A.*, a French corporation, Counterclaim Defendants; *Abbott Laboratories*, an Illinois corporation, *Fournier Industrie et Sante*, a French corporation, and *Laboratoires Fournier, S.A.*, a French corporation, Plaintiffs, v. *Impax Laboratories, Inc.*, a Delaware corporation, Defendant; Civil Action No. 03-120-KAJ; *Impax Laboratories, Inc.*, a Delaware corporation, Counterclaim Plaintiff, v. *Abbott Laboratories*, an Illinois corporation, *Fournier Industrie et Sante*, a French corporation, and *Laboratoires Fournier, S.A.*, a French corporation, Counterclaim Defendants.; *in re TriCor direct purchaser antitrust litigation*; Civil Action No. 05-340 (KAJ); *in re TriCor indirect purchaser antitrust litigation*; Civil Action No. 05-360 (KAJ)

State of California ex rel. Lockyer et al., Plaintiffs v. *Infineon Technologies AG et al.*, Defendants. Case No. C-06-04333 PJH US District Court for the Northern District of California, San Francisco Division

Natchitoches Parish Hospital Service District, on behalf of itself and all others similarly situated, Plaintiff, v. *Tyco International, Ltd., Tyco International, (U.S.), Inc., Tyco Healthcare Group, L.P., The Kendall Healthcare Products Company*, Civil Action No. 05-12024 PBS.

Daniels Sharpsmart, Inc. v. Tyco International, (US) Inc., Tyco Healthcare Group, L.P., Becton Dickinson and Company, Novation, LLC, VHA, Inc., Premier Inc., Premier Purchasing Partners, and Consorta, Inc., United States District Court for the Eastern District of Texas, Texarkana Division, Civil Action No. 5:05-cv-169

In re Wellbutrin SR antitrust litigation (direct purchaser actions), Civil Case no. 2:04-cv-5525 (E.D. Pa.); *Sheet Metal Workers Local 441 Health and Welfare Plan, et al. v. GlaxoSmithKline, plc, et al. (indirect purchaser actions)*, Civil Case no. 2:04-cv-5898 (E.D. Pa.); *Medical Mutual of Ohio, Inc. v. GlaxoSmithKline, plc, et al.*, Civil Case no. 2:05-cv-396 (E.D. Pa.)

In the Matter of the Form A Application by The Doctors Company, An Interinsurance Exchange, with Respect to the Acquisition of American Healthcare Indemnity Company, Hearing before the Insurance Commissioner of the State of Delaware, Docket No. 678

L-3 Communications Integrated Systems, LP, Plaintiff v. Lockheed Martin Corporation, Defendant, United States District Court for the Northern District of Texas, Dallas Division, Civil Action No. 3-07CV0341

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Testimony before Pennsylvania Insurance Department regarding proposed affiliation between Highmark, Inc. and the West Penn Allegheny Health System (April 17, 2012) and Report (Economic Analysis Of Highmark's Affiliation with WPAHS and Implementation of an Integrated Healthcare Delivery System), April 2013.

In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Commonwealth of Massachusetts, Plaintiff, v. Partners Healthcare System, Inc., South Shore Health and Educational Corp., and Hallmark Health Corp., Defendants, Civil Action No. 14-2033-BLS, Expert Declaration of Robert D. Willig and Margaret E. Guerin-Calvert

RESEARCH, PUBLICATIONS AND PRESENTATIONS

"Public Health, Public Policy, and the Law: Organizational Change in Healthcare" Presentation at Summer Institute on Health Policy, RWJF Center for Health Policy at Meharry Medical College, June 2014

"Issues in Consolidation—Industry Perspectives" Presentation at AHLA/ABA 2014 Antitrust in Health Care, May 2014

"Do Health Care Mergers Deliver Better Health Care?" Presentation at ABA Section of Antitrust Law Spring Meeting, March 2014

"Hospital Realignment: Mergers Offer Significant Patient and Community Benefits," (with Jen Maki) THE CENTER FOR HEALTHCARE ECONOMICS AND POLICY, January 2014.

"Assessing Hospital Mergers and Rivalry in an Era of Health Care Reform," (with Jeffrey Brennan) *Antitrust Magazine*, Summer 2013

Presentation at the ABA Retrospective Analysis of Agency Determinations in Merger Transactions Symposium, Washington, DC, June 2013

Signatory, Brief of Antitrust Economists as Amici Curiae before the Supreme Court, Federal Trade Commission v. Actavis, Inc., et al., No. 12-416 (February 28, 2013)

"The Direction and Economic Impact of Health Care Reform Post the Supreme Court Decision" Presentation at 2012 Ninth Circuit Judicial Conference, August 2012 (w/ Dawn Gideon, and Bruce Sokler)

Presentation to the Section of Antitrust Law Spring Meeting, March 2012, *Fundamentals – Antitrust Economics Analytical Tools*

Presentation at Pepper Hamilton's Annual Antitrust Developments Update CLE Event, Philadelphia, PA, December 2011, *Antitrust-Intellectual Property Regulatory and Litigation Update*

“Assessment of Cost Trends and Price Differences for U.S. Hospitals,” (with Guillermo Israilevich), March 2011

“U.S. Antitrust Law Developments,” *Canadian Competition Record*, Winter 2010

“A Critique of Recent Publications Claiming Provider Market Power,” (with Guillermo Israilevich), October 2010

Presentation at the Antitrust Masters Course V, Section of Antitrust Law, American Bar Association, Williamsburg, VA, September 2010, *Using Economists and Other Experts*

“U.S. Antitrust Law Developments,” *Canadian Competition Record*, Winter 2009

Presentation at the Georgetown Global Antitrust Enforcement Symposium, September 2009, *Monopolization and Dominance: How Will New Economic Thinking Affect Enforcement?*

Presentation to the Section of Antitrust Law Spring Meeting, March 2009, *Resources for Class Action Litigation: A Demonstration of Critical Issues and Techniques to Deal with them, An Economist's Perspective.*

“Coordinated Effects Analysis: Cruise Line Mergers (2002),” in J. Kwoka Jr. and L. White, eds. *The Antitrust Revolution*, (5th edition), 2009.

Presentation at the Georgetown Global Antitrust Enforcement Symposium, September 2008, *Lost in Translation: Is Economics the Lingua Franca of International Merger Control?*

“U.S. Antitrust Law Developments,” *Canadian Competition Record*, Spring 2008

“U.S. Antitrust Law Developments,” *Canadian Competition Record*, Summer 2007

“U.S. Antitrust Law Developments,” *Canadian Competition Record*, Fall 2006

Presentation at the American Bar Association Spring Conference, March 28-30, 2006, *Using Economic Experts.*

“Merchant Benefits and Public Policy towards Interchange: An Economic Assessment,” *The Review of Network Economics*, Vol. 4 Issue 4, December 2005. pp 384 - 414 (with Janusz A. Ordover, New York University and Competition Policy Associates), and also at the Federal Reserve Bank of New York and the Review of Network Economics conference on “Antitrust Activity in Card-Based Payment Systems: Causes and Consequences,” September 15, 2005.

“The Role of the Economist/Economics in ‘Proving’ Coordinated Effects,” the Milton Handler Annual Antitrust Review sponsored by the Association of the Bar of the City of New York. Published in *Columbia Business Law Review*. 2004 Milton Handler Antitrust Review, Colum. Bus. L. Rev. 345 Vol 2005 (2).

“U.S. Antitrust Law Developments,” *Canadian Competition Record*, Fall 2005

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Comments on “Regulations Amending the Canadian Computer Reservation Systems (CRS),”
November 2003

Testimony at the FTC and DOJ Hearings on Healthcare and Competition and Law and Policy,
February – May 2003

Presentation before the Computer Industry an Internet Committee Program, *Antitrust
Counterclaims in Patent Infringement Lawsuits*, American Bar Association – Section of Antitrust
Law, Spring Meeting, April 2-4, 2003.

“Economic Analysis of DOT Proposals to Change the CRS Rules,” Appendix to Comments of
Galileo International, (with I. Curtis Jernigan, and Gloria Hurdle), March 15, 2003.

“Economic Analysis of Healthcare Cost Studies Commissioned by Blue Cross Blue Shield
Association,” (with David Argue, Paul Godek, Barry Harris, Stephanie Mirrow), February 25,
2003.

“U.S. Antitrust Law Developments,” *Canadian Competition Record*, Winter 2002-2003.

“What’s New in Networks?” *Antitrust Litigator*, Summer 2002.

“Competition and Innovation in the Context of Network Economics,” at the DOJ/FTC Hearings
on Competition and Intellectual Property Law in the Knowledge-Based Economy, February 20,
2002.

“U.S. Antitrust Law Developments,” *Canadian Competition Record*, Winter 2001-2002.

“Review of Selected Economic Literature on Merger Analysis,” (with Stephanie Mirrow and Su
Sun), July 2001. *Perspectives on the Concepts of Time, Change, and Materiality in Antitrust
Enforcement*. Section of Antitrust Law, American Bar Association, (also presented at ABA
Annual Meeting, August 2001).

“U.S. Antitrust Law Developments,” *Canadian Competition Record*, Winter 2000-2001.

“Presenting Damages Evidence” before the Practicing Law Institute, *Antitrust Litigation:
Strategies for Success*, November 30, 2000.

“Overview of B2Bs: Which Ones Raise Antitrust Issues?” before the Sixth Annual Health Care
Forum, Northwestern University School of Law, November 2-3, 2000.

“An Economist’s Perspective on B2Bs,” *Economists Ink*, Fall 2000.

“How Do the New Competitor Collaboration Guidelines Address the New Economy?” before the ABA, Antitrust Section, Joint Ventures and Strategic Alliances, November 11-12, 1999.

“The Role of the Expert in Damages Analysis” before the Practicing Law Institute, November 8, 1999.

“Bank Mergers and the 1992 Merger Guidelines: The Bank of America/Security Pacific Transaction,” (with Janusz Ordover), September 1999 (prepared for presentation at the 25th Anniversary of the Economics Analysis Group at the US Department of Justice). *Review of Industrial Organization*, 16: 151 – 165, 2000.

“Maximizing current and future network competition in payment systems” (with Janusz Ordover) before the American Bar Association, Antitrust Section, Antitrust Issues in High-Tech Industries Workshop, Scottsdale, AZ, February 25-26, 1999.

Supplemental Analysis of “Inherent Reasonableness” Survey, prepared for HIMA (with Matthew Mercurio); February 1999.

Report on DMERC “Inherent Reasonableness” Survey, prepared for HIMA (with Matthew Mercurio); November 1998.

Summary Report: Interviews of Representative HIMA Members’ Views on FASA, prepared for HIMA (with Matthew Mercurio); July 1997.

“Networks and Network Externalities: What the Antitrust Lawyer Needs to Know: Concepts and Theory,” before the American Bar Association, Antitrust Section, 45th Annual Spring Meeting, Washington, DC, April 10, 1997.

“Insights into Efficiencies from Analyses of Efficiencies in Hospital and Bank Mergers,” before the American Bar Association, Antitrust Law Section, Washington, DC, November 7-8, 1996.

“Issues in Managed Care “Markets,” before the American Bar Association Forum on Health Law and Antitrust Law Section (with Robert B. Greenbaum), New Orleans, Louisiana, October 24-25, 1996.

“Current Merger Policy: Banking and ATM Network Mergers,” *Antitrust Bulletin*, Vol. XLI, No. 2, Summer 1996.

“ATM and Bank Electronic Networks: Competitive Issues and Technological Change,” for presentation at the 71st Annual WEA International Conference, June 29, 1996.

“Assessing the Implications of Kodak for Franchise Market Power Issues,” before the American Bar Association, Antitrust Law Section, Spring Meeting, Washington, DC, March 27, 1996.

“Current Merger Policy: Banking and ATM Network Mergers,” before the OCC Conference, November 1995.

“Economists and Empirical Analysis in the Merger Review Process: Beyond Market Share and HHI Calculations,” before the American Bar Association, Antitrust Law Section and the International Bar Association Antitrust and Trade Law Committee, Washington, DC, November 9-10, 1995.

“Network Merger Analysis,” for presentation at the 43rd Annual American Bar Association, Antitrust Law Section, April 6, 1995.

“Assessing the Implications of Bank Merger Transactions after Interstate Banking and Branching Legislation: Lessons to Be Drawn From Bank Merger Cases and Analysis in the ‘90’s,” for presentation at ACI Third Annual Bank Regulation Conference, Washington, DC, March 16, 1995.

“Key Issues in Antitrust Analysis of Bank Mergers in the 1990’s,” for presentation at the Bank Mergers and Acquisitions Program Practicing Law Institute, September 12-13, 1994.

“Economic Issues in Network Merger Analysis,” for presentation at Mergers: The Cutting Edge before the American Bar Association, 1994 Annual Meeting, New Orleans, August 9, 1994.

“Vertical Integration as a Threat to Competition Airline Computer Reservation Systems,” in J. Kwoka Jr. and L. White, eds. *The Antitrust Revolution*, (2nd edition), 1993.

“The 1992 Agency Horizontal Merger Guidelines and the Department of Justice’s Approach to Bank Merger Analysis,” *Antitrust Bulletin*, Vol. XXXVII, No. 3, Fall 1992, (with Janusz Ordovery).

“The 1992 Agency Horizontal Merger Guidelines and the Department of Justice Approach to Bank Mergers,” in *Proceedings of the 28th Annual Conference on Bank Structure and Competition*, May 1992, (with Janusz Ordovery).

Electronic Services Networks: A Business and Public Policy Challenge, Praeger, 1991, (with S. Wildman).

“Computer Reservations Systems and their Network Linkages to the Airline Industry,” in *Electronic Services, Networks: A Business and Public Policy Challenge*, Praeger, 1991, (with R. Noll).

“Electronic Services Networks Functions, Structures, and Public Policy” in *Electronic Services Networks: A Business and Public Policy Challenge*, Praeger, 1991, (with S. Wildman).

“New Developments in Airline Merger Analysis: Changes in the Industry and the Evidence,” *Regulatory Reform*, January 1988.

“State and Federal Regulation in the Market for Corporate Control,” EAG Discussion Paper, EAG 86-4, *Antitrust Bulletin*, Winter 1988, (with R. McGuckin and F. Warren-Boulton).

“Current Issues in Airline Mergers,” presented at the Stanford Conference on Firm Ownership and Competition, June 19-20, 1987.

“The 1982 Department of Justice Guidelines: Applications to Banking Markets,” *Issues in Bank Regulation*, Winter 1983, reprinted in T. Havrilesky, R. Schweitzer, and J. Boorman, ed. *Dynamics of Banking*, Harlan Davidson, Inc., 1985.

Department of Justice, *Report to Congress on the Computer Reservations Industry*, December 1985.

“New Rules of the Game: Modifying Bank Merger Analysis to Account for Regulatory Changes,” presented at the Association of Public Policy and Management Conference, New Orleans, October 1984

“The Determinants of Thrift Institutions’ Commercial Lending Activity,” *Chicago Bank Structure and Competition Compendium*, September 1983, (with C. Dunham).

“How Quickly Can Thrifts Move into Commercial Lending?” *New England Economic Review*, November/December 1983, (with C. Dunham).

Department of Justice, *Report to Congress on Competition in the Coal Industry*, March 1982.

Direct and Rebuttal Testimony in the *Investigation into the Competitive Marketing of Air Transportation*, at the Civil Aeronautics Board, August 1980.

National Benefits/Costs of Enhanced Oil Recovery Research Final Report, Arthur D. Little, Inc., submitted to the Energy Research and Development Administration, August 1976, (with F. Mansvelt-Beck and T. Rothermal)

OTHER PROFESSIONAL ACTIVITIES

Member, International Task Force, Section of Antitrust Law, American Bar Association and its Committees, including Healthcare and Pharmaceuticals

Member, American Economics Association

PAST PROFESSIONAL ACTIVITIES

Chair, Interagency Task Force on Bank Competition (at the U.S. Department of Justice, Antitrust Division)

Co-Chair, Economics Task Force, Member, Technology and Financial Resources Task Force, Chair of the Membership Committee, Transition Task Force Member, Chair of the Exemptions and Immunities Task Force, Council Member, Chair, Financial Markets and Institutions Committee, Member Advisory Board on Section Reserves, Long Range Planning Committee, Section of Antitrust Law, American Bar Association

APPENDIX A: CURRICULUM VITAE OF MARGARET E. GUERIN-CALVERT

MARGARET GUERIN-CALVERT, PAGE 13

Testimony at Trial or Deposition in Last Four Years

In the Matter of the Form A Application by The Doctors Company, An Interinsurance Exchange, with Respect to the Acquisition of American Healthcare Indemnity Company, Hearing before the Insurance Commissioner of the State of Delaware, Docket No. 678

L-3 Communications Integrated Systems, LP, Plaintiff v. Lockheed Martin Corporation, Defendant, United States District Court for the Northern District of Texas, Dallas Division, Civil Action No. 3-07CV0341

DataTreasury Corporation v. Wells Fargo & Company, et al., Defendants, United States District Court for the Eastern District of Texas, Marshall Division, Civil Action No. 2:06CV-72(DF)

Federal Trade Commission and The State of Ohio v. ProMedica Health System, Inc., United States District Court for the Northern District of Ohio, Western Division, Case No. 3:11-cv-00047-DAK

*Testimony before Pennsylvania Insurance Department regarding proposed affiliation between Highmark, Inc. and the West Penn Allegheny Health System (April 17, 2012) and Report (Economic Analysis Of Highmark's Affiliation with WPAHS and Implementation of an Integrated Healthcare Delivery System), April 2013.

In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

**Commonwealth of Massachusetts, Plaintiff, v. Partners Healthcare System, Inc., South Shore Health and Educational Corp., and Hallmark Health Corp., Defendants*, Civil Action No. 14-2033-BLS, Expert Declaration of Robert D. Willig and Margaret E. Guerin-Calvert

*Public Report or Declaration

APPENDIX B: MATERIALS RELIED UPON BY MARGARET E. GUERIN-CALVERT

Legal Filings

January 10, 2013, Indirect Purchaser Plaintiffs' Fourth Consolidated Amended Complaint, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Darrell Williams, Ph.D., August 5, 2014, Expert Report of Dr. Darrell Williams, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Janet S. Netz, Ph.D., May 25, 2011, Expert Report of Janet S. Netz, Ph.D., In re: TFT-LCD (Flat Panel) Antitrust Litigation, (United States District Court Northern District of California San Francisco Division)

Janet S. Netz, Ph.D., October 1, 2012, Declaration of Janet S. Netz, Ph.D., In Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Janet S. Netz, Ph.D., February 15, 2013, Declaration of Janet S. Netz, Ph.D., in Support of Indirect-Purchaser Plaintiffs' Opposition to Defendants' Motion to Strike the Proposed Expert Testimony of Dr. Janet S. Netz, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Janet S. Netz, Ph.D., February 15, 2013, Rebuttal Declaration of Janet S. Netz, Ph.D., in Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Janet S. Netz, Ph.D., April 15, 2014, Expert Report and Backup of Janet S. Netz, Ph.D., In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Janet S. Netz, Ph.D., July 3, 2014, Errata to the Expert Report of Janet S. Netz, Ph.D., In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Janet S. Netz, Ph.D., September 26, 2014, Rebuttal Expert Report and Backup of Janet S. Netz, Ph.D., In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Margaret E. Guerin-Calvert, August 5, 2014, Expert Report and Backup of Margaret E. Guerin-Calvert, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Robert D. Willig, December 17, 2012, Expert Report of Robert D. Willig, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

APPENDIX B: MATERIALS RELIED UPON BY MARGARET E. GUERIN-CALVERT

Robert D. Willig, March 25, 2013, Rebuttal Declaration of Professor Robert D. Willig In Support of Defendants' Motion to Strike The Proposed Expert Testimony of Dr. Janet S. Netz, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Robert D. Willig, August 5, 2014, Expert Report of Robert D. Willig, Indirect Purchaser Class Action, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

APPENDIX B: MATERIALS RELIED UPON BY MARGARET E. GUERIN-CALVERT

Depositions

Deposition of Deok-Yun Kim, Vol. 1, March 27, 2013

Deposition of Deok-Yun Kim, Vol. 2, March 28, 2013

Deposition of Deok-Yun Kim, Vol. 3, March 29, 2013

Deposition of Hoon Choi, Vol. 1, June 19, 2013

Deposition of Hoon Choi, Vol. 2, June 20, 2013

Deposition of Hoon Choi, Vol. 3, June 21, 2013

Deposition of Hun Sul Chu, Vol. 1, February 11, 2014

Deposition of Hun Sul Chu, Vol. 2, February 12, 2014

Deposition of Hun Sul Chu, Vol. 3, February 13, 2014

Deposition of In Hwan Song, Vol. 1, December 12, 2012

Deposition of In Hwan Song, Vol. 2, December 13, 2012

Deposition of Jae In Lee, Vol. 1, July 24, 2013

Deposition of Jae In Lee, Vol. 2, July 25, 2013

Deposition of Jae In Lee, Vol. 3, July 26, 2013

Deposition of Janet S. Netz, June 27, 2014

Deposition of Janet S. Netz, October 31, 2014

Deposition of Jun Yeol Youn, Vol. 1, September 11, 2013

Deposition of Jun Yeol Youn, Vol. 2, September 12, 2013

Deposition of Jun Yeol Youn, Vol. 3, September 13, 2013

Deposition of Kazuhiro Nishimaru, Vol. 1, June 26, 2013

Deposition of Kenneth G. Elzinga, Ph.D., July 17, 2014

Deposition of Margaret E. Guerin-Calvert, September 17, 2014

Deposition of SDI 30(b)(6) Witness Jaein Lee, Vol. 1, June 6, 2012

Deposition of SDI 30(b)(6) Witness Jaein Lee, Vol. 2, June 7, 2012

Deposition of Tatsuo Tobinaga, Vol. 1, July 16, 2012

Deposition of Tatsuo Tobinaga, Vol. 2, July 16, 2012

Deposition of Yu-Hao Zhang, A.K.A. Allen Chang, Vol. 1, March 12, 2014

APPENDIX B: MATERIALS RELIED UPON BY MARGARET E. GUERIN-CALVERT**Bates Stamped Documents**

CHU00005963	HDPE – CRT 00048109
CHU00014202 - CHU00014206	HEDUS-CRT00169116
CHU00028589 - CHU00028590	LPD-NL00018253 - LPD-NL00018266
CHU00028604 - CHU00028605	LPD-NL00018267 - LPD-NL00018336
CHU00028728 - CHU00028729	LPD-NL00173522 - LPD-NL00173665
CHU00028763 - CHU00028767	LPD-NL00214381 - LPD-NL00214444
CHU00028773 - CHU00028774	LPD-NL00214482 - LPD-NL00214522
CHU00028803 - CHU00028804	PHLP-CRT-002306 - PHLP-CRT-002314
CHU00028933 - CHU00028945	PHLP-CRT-015235
CHU00028952 - CHU00028954	PHLP-CRT-090615
CHU00030695 - CHU00030697	SDCRT-0002805E - SDCT-0002860E
CHU00030888 - CHU00030893	SDCRT-0006043 - SDCRT-0006044
CHU00031075 - CHU00031087	SDCRT-0021278 - SDCRT-0021294
CHU00031249 - CHU00031250	SDCRT-0086208 - SDCRT-0086210
CHU00031268E - CHU00031269E	SDCRT-0086537 - SDCRT-0086539
CHU00071226	SDCRT-0086662 - SDCRT-0086664
CHU00071480 - CHU0071482	SDCRT-0086675 - SDCRT-0086681
CHU00608095 - CHU00608105	SDCRT-0088756 - SDCRT-0088762
CHWA00256934	SDCRT-0088819 - SDCRT-0088821
EIN0017699 – EIN0018075	SDCRT-0088852 - SDCRT-0088856
HDP-CRT00048109	SDCRT-0090077 - SDCRT-0090079
HDP-CRT00055162 - HDP-CRT00055165	SDCRT-0090100 - SDCRT-0090101

APPENDIX B: MATERIALS RELIED UPON BY MARGARET E. GUERIN-CALVERT

SDCRT-0090253 - SDCRT-0090254	SDCRT-0104660 - SDCRT-01046601
SDCRT-0090267 - SDCRT-0090274	SDCRT-0201291
SDCRT-0090278 - SDCRT-0090279	SDCRT-0203634 - SDCRT-0203664
SDCRT-0090299 - SDCRT-0090301	SDCRT-0203634 - SDCRT-0203664
SDCRT-0090306 - SDCRT-0090311	TAEC00105573
SDCRT-0090312 - SDCRT-0090313	TAEC-CRT-00065220
SDCRT-0090319 - SDCRT-0090321	TAEC-CRT-00018123
SDCRT-0090328 - SDCRT-0090338	TAEC-CRT-00065484
SDCRT-0090346 - SDCRT-0090349	TAEC-CRT-00074796 - 4831
SDCRT-0090350 - SDCRT-0090353	TAEC-CRT-00083305
SDCRT-0091643 - SDCRT-0091647	TET-CRT-00003403
SDCRT-0091656 - SDCRT-0091659	TSB – CRT 00036829
SDCRT-0091919 - SDCRT-0091920	TSB-CRT-00041721 – TSB-CRT-00041724

APPENDIX B: MATERIALS RELIED UPON BY MARGARET E. GUERIN-CALVERT**Netz Target Price Documents**

CHU00005997E	CHU00028638E	CHU00028758E
CHU00014210E	CHU00028642E	CHU00028760E
CHU00014218E	CHU00028645E	CHU00028763E
CHU00017037E	CHU00028654E	CHU00028768E
CHU00020661E	CHU00028663E	CHU00028773E
CHU00020779E	CHU00028666E	CHU00028776E
CHU00022724E	CHU00028668E	CHU00028786E
CHU00022728E	CHU00028670E	CHU00028803E
CHU00022738E	CHU00028674E	CHU00028815E
CHU00024554E	CHU00028677E	CHU00028817E
CHU00024560E	CHU00028687E	CHU00028869E
CHU00028209E	CHU00028689E	CHU00028873E
CHU00028240E	CHU00028691E	CHU00028909E
CHU00028283E	CHU00028698E	CHU00028952E
CHU00028293E	CHU00028701E	CHU00028955E
CHU00028297E	CHU00028707E	CHU00028958E
CHU00028385E	CHU00028711E	CHU00028959E
CHU00028396E	CHU00028713E	CHU00028975E
CHU00028434E	CHU00028725E	CHU00029046E
CHU00028441E	CHU00028728E	CHU00029062E
CHU00028589E	CHU00028730E	CHU00029065E
CHU00028599E	CHU00028740E	CHU00029105E
CHU00028604E	CHU00028746E	CHU00029108E
CHU00028606E	CHU00028752E	CHU00029110E

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CHU00029116E	CHU00030414E	CHU00030835E
CHU00029131E	CHU00030426E	CHU00030851E
CHU00029138E	CHU00030449E	CHU00030855E
CHU00029144E	CHU00030458E	CHU00030888E
CHU00029147E	CHU00030468E	CHU00030917E
CHU00029152E	CHU00030497E	CHU00030960E
CHU00029163E	CHU00030505E	CHU00030965E
CHU00029171E	CHU00030506E	CHU00030973E
CHU00029175E	CHU00030530E	CHU00031006E
CHU00029179E	CHU00030547E	CHU00031010E
CHU00029185E	CHU00030665E	CHU00031013E
CHU00029214	CHU00030670E	CHU00031018E
CHU00029228E	CHU00030684E	CHU00031047E
CHU00029235E	CHU00030717E	CHU00031051E
CHU00029245E	CHU00030745E	CHU00031056E
CHU00029259E	CHU00030763E	CHU00031075E
CHU00029262E	CHU00030766E	CHU00031101E
CHU00029971E	CHU00030787E	CHU00031111E
CHU00029987E	CHU00030797E	CHU00031113E
CHU00029999E	CHU00030807E	CHU00031142E
CHU00030005E	CHU00030809E	CHU00031150E
CHU00030020E	CHU00030819E	CHU00031174E
CHU00030036E	CHU00030823E	CHU00031176E
CHU00030071E	CHU00030827E	CHU00031180E
CHU00030410E	CHU00030831E	CHU00031202E

APPENDIX B: MATERIALS RELIED UPON BY MARGARET E. GUERIN-CALVERT

CHU00031214E	CHU00548418	MTPD-0423651E
CHU00031221E	CHU00608095E	MTPD-0423668
CHU00031240E	CHU00660194E	MTPD-0423675E
CHU00031248E	CHU00660217E	MTPD-0426088E
CHU00031249E	CHU00660247E	MTPD-0479714_CT
CHU00031253E	CHU00660306	MTPD-0479715_CT
CHU00031279E	CHU00660366E	MTPD-0479726_EN
CHU00036384E	CHU00660369	MTPD-0483335
CHU00036386E	CHU00660395	MTPD-0493552
CHU00036390E	CHU00660408	MTPD-0493552_EN
CHU00036392E	CHU00660436	MTPD-0517933
CHU00036394E	CHU00660446	MTPD-0580726E
CHU00036408E	CHU00660454	MTPD-0580737E
CHU00036414E	CHU00660681	MTPD-0580741
CHU00071480E	CHU00660728	MTPD-0580751E
CHU00123375E	CHU00732816E	MTPD-0580775
CHU00123393E	CHU00732831E	MTPD-0580795_EN
CHU00123530E	HDP-CRT00025921	MTPD-0580798E
CHU00123742E	MTPD-0343949E	MTPD-0580812E
CHU00124103E	MTPD-0400554_EN	MTPD-0580821
CHU00124930	MTPD-0400573	MTPD-0607571E
CHU00125162E	MTPD-0400578_EN	MTPD-0607585_EN
CHU00125195	MTPD-0400580E	MTPD-0607598E
CHU00125374	MTPD-0400597	SDCRT-0002984
CHU00375118E	MTPD-0423645E	SDCRT-0003084

APPENDIX B: MATERIALS RELIED UPON BY MARGARET E. GUERIN-CALVERT

SDCRT-0005830-42	SDCRT-0086662E	SDCRT-0088773
SDCRT-0007580	SDCRT-0086672E	SDCRT-0088819
SDCRT-0007588	SDCRT-0086698E	SDCRT-0090197E
SDCRT-0063870E-71E	SDCRT-0086703E	SDCRT-0090210-14
SDCRT-0080694	SDCRT-0086751E-53E	SDCRT-0091027
SDCRT-0086230	SDCRT-0087007	SDCRT-0091353E
SDCRT-0086256	SDCRT-0087312-13	SDCRT-0091364E
SDCRT-0086256_557E	SDCRT-0087371	SDCRT-0091372E
SDCRT-0086416E	SDCRT-0087393E-98E	SDCRT-0091374E
SDCRT-0086434E	SDCRT-0087427E	SDCRT-0091377E-81E
SDCRT-0086449E	SDCRT-0087437-40	SDCRT-0091382E
SDCRT-0086485E-86E	SDCRT-0087441-704	SDCRT-0091397E
SDCRT-0086487E-88E	SDCRT-0087662E	SDCRT-0091400E
SDCRT-0086503	SDCRT-0087667E	SDCRT-0091599E
SDCRT-0086512E	SDCRT-0087741	TAEC-CRT-00089342
SDCRT-0086545E	SDCRT-0087931-32	TAEC-CRT-00089968
SDCRT-0086557E	SDCRT-0087934E	TSB-CRT-00036875
SDCRT-0086563E	SDCRT-0087938E	
SDCRT-0086586E-87E	SDCRT-0088635	
SDCRT-0086593E	SDCRT-0088661	
SDCRT-0086597E	SDCRT-0088675-80	
SDCRT-0086605E	SDCRT-0088713E	
SDCRT-0086632E	SDCRT-0088715E-19E	
SDCRT-0086641E	SDCRT-0088720E-25E	
SDCRT-0086649E	SDCRT-0088732E	

APPENDIX B: MATERIALS RELIED UPON BY MARGARET E. GUERIN-CALVERT**Source Files**

065_Part 1 - 2009-04-20 - Investigation of the Causes of the Bankruptcy of LG Philips Displays.PDF	combine_target_defendant.dta HDP-CRT00019322_rough_translation.xls
066_Part 2 - 2009-04-20 - Investigation of the Causes of the Bankruptcy of LG Philips Displays.PDF	input_data.do mtpd-0416090.dta
all_defendants_dropexout_collapsed.dta	oecd_data.dta
bok_glass_ppi.dta	SDCRT-0201291.dta
capacity_database.dta	Sensitivity Table.xlsx
capacity_db_linetype.dta	target_index.dta
CDT data.xlsx	Target price-structure.xlsx
chu00071226.dta	total production.do
clean_defendant.dta	total production.xlsx
clean_target.dta	vendor_map.do
estimation_size.dta	vendor_map.xlsx

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APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS**Table 1A¹**

Specification:			1995-2006	2007	1995	1996	1997-2006	2007	Weighted Average Overcharge		
	Size	Model							1995-2006	Using 97-06 OC for 95/6	2007
(1)	>15 inches	Dr. Netz's Estimates of Overcharges	-16.5%	-16.5%*					7.4%	NA	0.4%
(2)	<=15 inches	Dr. Netz's Estimates of Overcharges	21.3%***	2.7%							
(3)	>15 inches	Addition of Cost and Demand Control Variables	-6.1%	-8.9%					3.1%	NA	0.0%
(4)	<=15 inches	Addition of Cost and Demand Control Variables	8.9%	-12.5%							
(5)	>15 inches	Addition of Cost and Demand Control Variables			-22.4%	-5.0%	-5.0%	-8.6%	1.6%	0.0%	0.0%
(6)	<=15 inches	Addition of Cost and Demand Control Variables			12.7%***	18.2%***	-5.7%	-17.6%**			
(7)	<=15 inches	Addition of Sig. Cost and Demand Control Variables	8.9%	-12.4%					3.1%	NA	0.0%
(8)	<=15 inches	Addition of Sig. Cost and Demand Control Variables			14.4%***	19.3%***	-5.8%	-15.6%***	1.8%	0.0%	0.0%

Notes: (i) "****" indicates statistical significance at 1%; "***" at 5%; "*" at 10%; (ii) the overcharge relative to the actual price is calculated by first converting the regression coefficient to percent terms using the formula: $c = \exp(b - 0.5 V(b)) - 1$, where b is the coefficient on the cartel dummy and $V(b)$ is the variance of b . The overcharge as a percent of actual price is then calculated as $1 - 1/(1+c)$; (iii) the weighted average overcharge is calculated by using the sales share of large and small CDTs in Dr. Netz's estimation data (estimation_size.dta); (iv) the following additional control variables were used in rows (3)-(6): Korean labor cost index, Won-USD exchange rate, Baltic Dry shipping index, and worldwide desktop shipments; (v) Weighted coefficients are weighted by revenue in Dr. Netz's regression data; (vi) For each above model, a chow test of the equality of coefficients between large and small CDTs rejects that the coefficients are jointly equal at the 0.1% significance level; (vii) In row (7), Baltic Dry shipping index, which is not statistically significant in the small CDT regression, has been removed. In row (8), Korean labor cost index, which is not statistically significant in the small CDT regression, has been removed; (viii) When IMF fuel costs are added to the regressions in rows (5) and (6), the weighted average overcharge for all years is 1.6% (0.0% if 1997-2006 overcharges are applied to 1995 and 1996).

Sources: (1) Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba; (2) Bloomberg L.P., OECD StatExtracts Database, Federal Reserve Bank of St. Louis, International Monetary Fund, Display Search.

¹ See my backup file "CDT OC Summary.xlsx".

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS**Table 6A²****Heterogeneity of CDT Price Movements**

	Category 1	Category 2	Share of Products Pairs in Categories 1 and 2 Whose Relative Price Changed by at Least 5%	Average Relative Price Change for Product Pairs in Categories 1 and 2 Whose Relative Price Changed by at Least 5%
Differences Within Categories	CDT	CDT	34%	10%
	Non-large CDT	Non-large CDT	36%	11%
	Large CDT	Large CDT	29%	10%
Differences Across Categories	Non-large CDT	Large CDT	39%	10%
	Large CDT	Non-large CDT	39%	11%

Source: Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba

² See my backup file “Price Movements.xlsx”.

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS

Notes for Heterogeneity of CDT Price Movements

Notes:

- (1) An observation represents the quarter-to-quarter change in the price expressed in USD for a given CRT model, factory, customer, and the currency in which the prices were negotiated (the "negotiated currency"), over two consecutive quarters, using global CRT sales data for Q1 1995 to Q4 2007;
- (2) The average quantity associated with a given observation was calculated as the geometric mean of the quantity sold of the corresponding CRT model, factory, customer, and negotiated currency in each of the two quarters over which the price change was calculated;
- (3) The change in relative prices was calculated for all pairwise combinations of observations from Category 1 and Category 2, with the exception of combinations between an observation and itself, which were excluded when calculating differences within categories;
- (4) Define the weight for each pair of observations as the geometric mean of the average quantity associated with each observation in the pair;
- (5) The share of relative price changes of at least 5% was determined using the pair-weights defined above;
- (6) The average relative price change among relative price changes of at least 5% was determined using the pair-weights defined above;
- (7) Prices were excluded as outliers as follows: For each quarter in which a given CRT model produced in a given factory was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was produced in the same factory and sold to the same customer in the same currency. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, factory, customer, currency, and quarter were excluded as outliers if: (a) the price for the model, factory, customer, and currency experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which the same model was produced in the same factory and sold to the same customer, or vice versa; (b) it was the first quarter in which the model was produced at that factory and sold to that customer in that currency and the price experienced a very large increase or decrease in the next quarter in which the model was produced at that factory and sold to that customer in that currency; or (c) it was the last quarter in which the model was produced in that factory and sold to that customer in that currency and the price experienced a very large increase or decrease from the previous quarter in which the model was produced in that factory and sold to that customer in that currency;
- (8) The following observations were also excluded: (a) observations for which the application, model number, customer name, negotiated currency, or quarter were missing; and (b) sales between integrated entities that sold CRTs.
- (9) The results presented in both columns differ by less than one percentage point if Category 1 and Category 2 are reversed.

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS**Table 6B³**

Heterogeneity of CDT Price Movements
(For Sales with Negotiated Currency Price Change of at Least 1%)

	Category 1	Category 2	Share of Products Pairs in Categories 1 and 2 Whose Relative Price Changed by at Least 5%	Average Relative Price Change for Product Pairs in Categories 1 and 2 Whose Relative Price Changed by at Least 5%
Differences Within Categories	CDT	CDT	39%	10%
	Non-large CDT	Non-large CDT	44%	11%
	Large CDT	Large CDT	32%	10%
Differences Across Categories	Non-large CDT	Large CDT	44%	11%
	Large CDT	Non-large CDT	45%	11%

Source: Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba

³ See my backup file "Price Movements.xlsx".

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS

Notes for Heterogeneity of CDT Price Movements (For Sales with Negotiated Currency Price Change of at Least 1%)

Notes:

(1) An observation represents the quarter-to-quarter change in the price expressed in USD for a given CRT model, factory, customer, and the currency in which the prices were negotiated (the "negotiated currency"), over two consecutive quarters, using global CRT sales data for Q1 1995 to Q4 2007;

The average quantity associated with a given observation was calculated as the geometric mean of the quantity sold of the corresponding CRT model, factory, customer, and negotiated currency in each of the two quarters over which the price change was calculated;

(3) The change in relative prices was calculated for all pairwise combinations of observations from Category 1 and Category 2, with the exception of combinations between an observation and itself, which were excluded when calculating differences within categories;

(4) Define the weight for each pair of observations as the geometric mean of the average quantity associated with each observation in the pair;

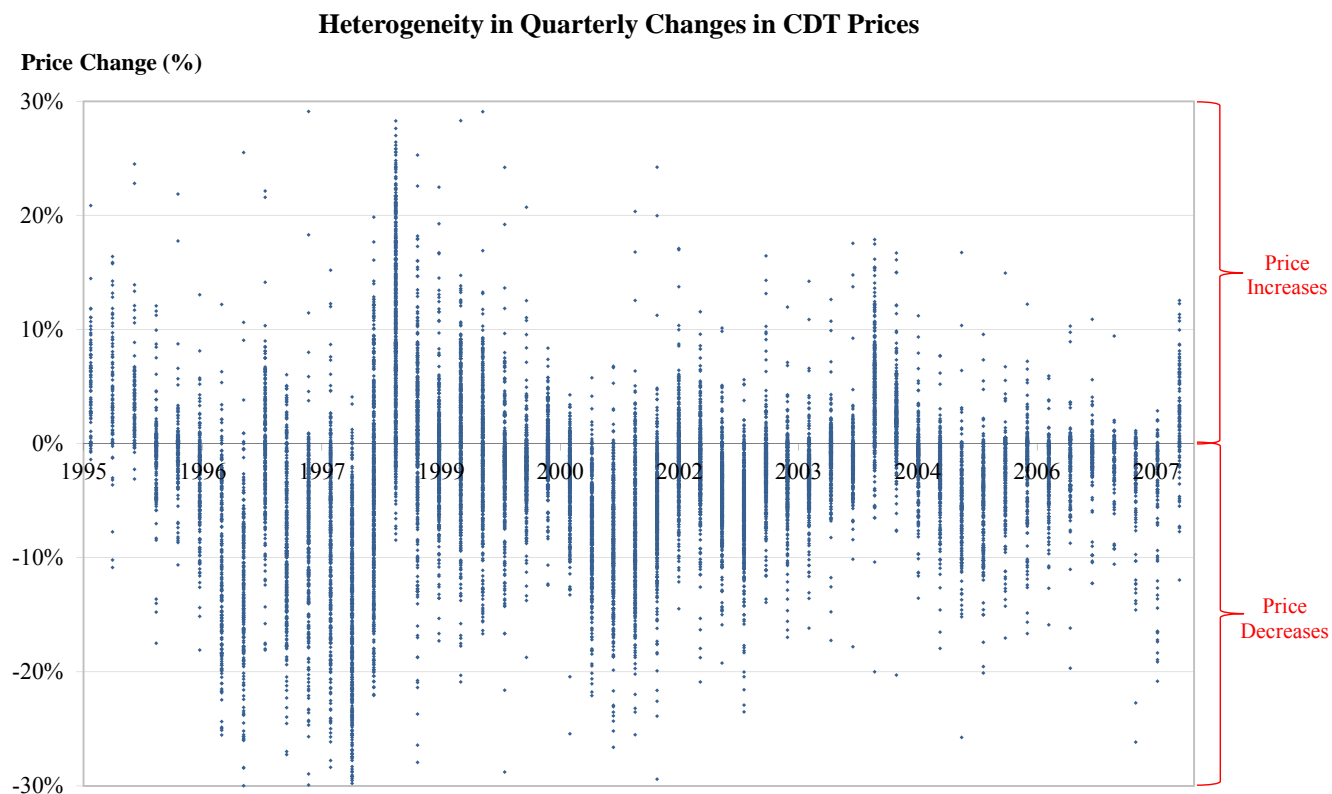
(5) The share of relative price changes of at least 5% was determined using the pair-weights defined above;

(6) The average relative price change among relative price changes of at least 5% was determined using the pair-weights defined above;

(7) Prices were excluded as outliers as follows: For each quarter in which a given CRT model produced in a given factory was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was produced in the same factory and sold to the same customer in the same currency. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, factory, customer, currency, and quarter were excluded as outliers if: (a) the price for the model, factory, customer, and currency experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which the same model was produced in the same factory and sold to the same customer, or vice versa; (b) it was the first quarter in which the model was produced at that factory and sold to that customer in that currency and the price experienced a very large increase or decrease in the next quarter in which the model was produced at that factory and sold to that customer in that currency; or (c) it was the last quarter in which the model was produced in that factory and sold to that customer in that currency and the price experienced a very large increase or decrease from the previous quarter in which the model was produced in that factory and sold to that customer in that currency;

(8) The following observations were also excluded: (a) observations for which the application, model number, customer name, negotiated currency, or quarter were missing; (b) sales between integrated entities that sold CRTs; and (c) observations for which the price in negotiated currency changed by less than 1% from the price in the previous quarter.

(9) The results presented in both columns differ by less than one percentage point if Category 1 and Category 2 are reversed.

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS**Figure 4A⁴**

Source: Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba

⁴ See my backup file "Heterogeneity in Quarterly Price Changes.xlsx".

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS

Notes for Heterogeneity in Quarterly Changes in CDT Prices

Notes:

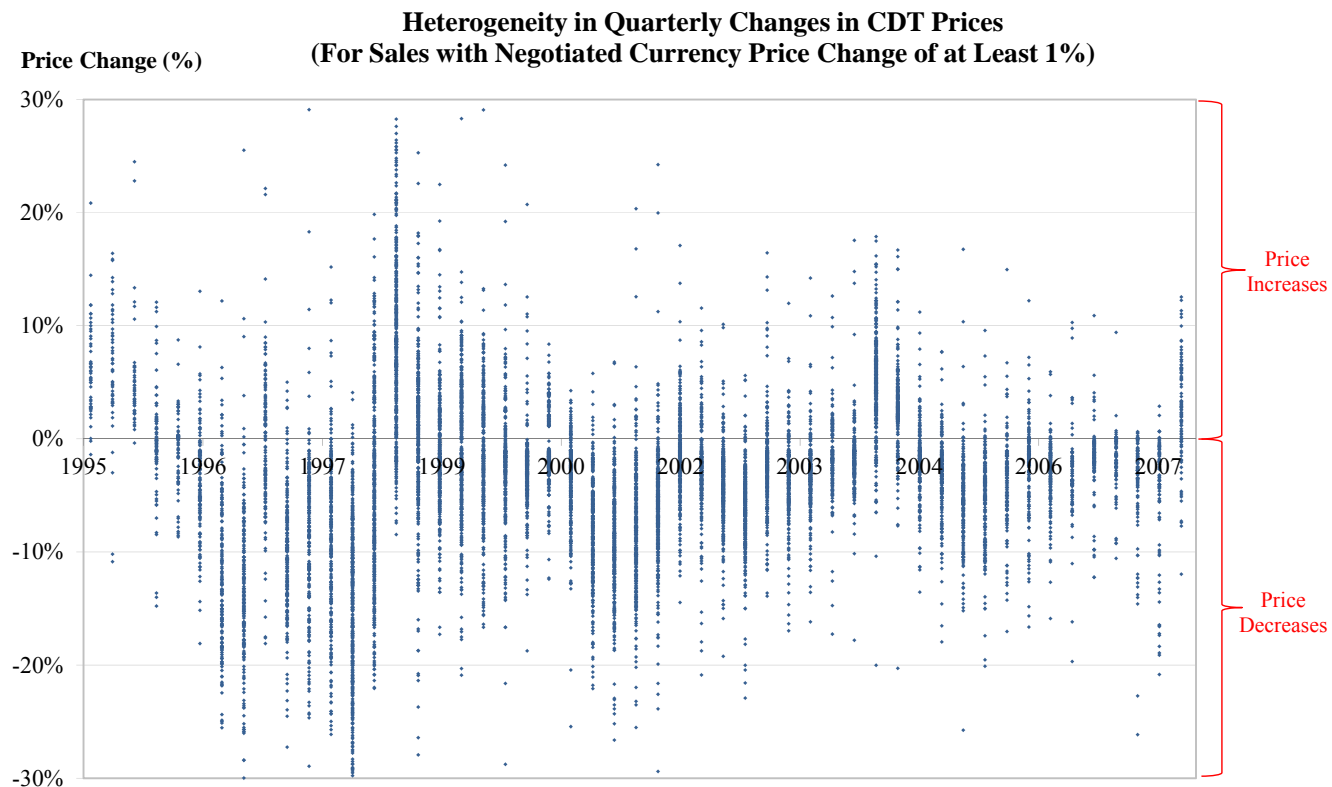
(1) A point on the above chart represents the quarter-to-quarter change in the price expressed in USD for a given CDT model, factory, customer, and the currency in which the prices were negotiated (the "negotiated currency"), over two consecutive quarters using global CDT sales data for Q1 1995 to Q4 2007;

(2) Prices were excluded as outliers as follows: For each quarter in which a given CDT model produced in a given factory was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was produced in the same factory and sold to the same customer in the same currency. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, factory, customer, currency, and quarter were excluded as outliers if: (a) the price for the model, factory, customer, and currency experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which the same model was produced in the same factory and sold to the same customer, or vice versa; (b) it was the first quarter in which the model was produced at that factory and sold to that customer in that currency and the price experienced a very large increase or decrease in the next quarter in which the model was produced at that factory and sold to that customer in that currency; or (c) it was the last quarter in which the model was produced in that factory and sold to that customer in that currency and the price experienced a very large increase or decrease from the previous quarter in which the model was produced in that factory and sold to that customer in that currency.

(3) The following observations were also excluded: (a) observations for which the application, model number, customer name, negotiated currency, or quarter were missing; and (b) sales between integrated entities that sold CRTs.

(4) A de minimis number of observations are outside the bounds of the y-axis;

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS

Figure 4B⁵

Source: Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba

⁵ See my backup file "Heterogeneity in Quarterly Price Changes.xlsx".

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS

Notes for Heterogeneity in Quarterly Changes in CDT Prices (For Sales with Negotiated Currency Price Change of at Least 1%)

Notes:

(1) A point on the above chart represents the quarter-to-quarter change in the price expressed in USD for a given CDT model, factory, customer, and the currency in which the prices were negotiated (the "negotiated currency"), over two consecutive quarters using global CDT sales data for Q1 1995 to Q4 2007;

(2) Prices were excluded as outliers as follows: For each quarter in which a given CDT model produced in a given factory was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was produced in the same factory and sold to the same customer in the same currency. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, factory, customer, currency, and quarter were excluded as outliers if: (a) the price for the model, factory, customer, and currency experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which the same model was produced in the same factory and sold to the same customer, or vice versa; (b) it was the first quarter in which the model was produced at that factory and sold to that customer in that currency and the price experienced a very large increase or decrease in the next quarter in which the model was produced at that factory and sold to that customer in that currency; or (c) it was the last quarter in which the model was produced in that factory and sold to that customer in that currency and the price experienced a very large increase or decrease from the previous quarter in which the model was produced in that factory and sold to that customer in that currency.

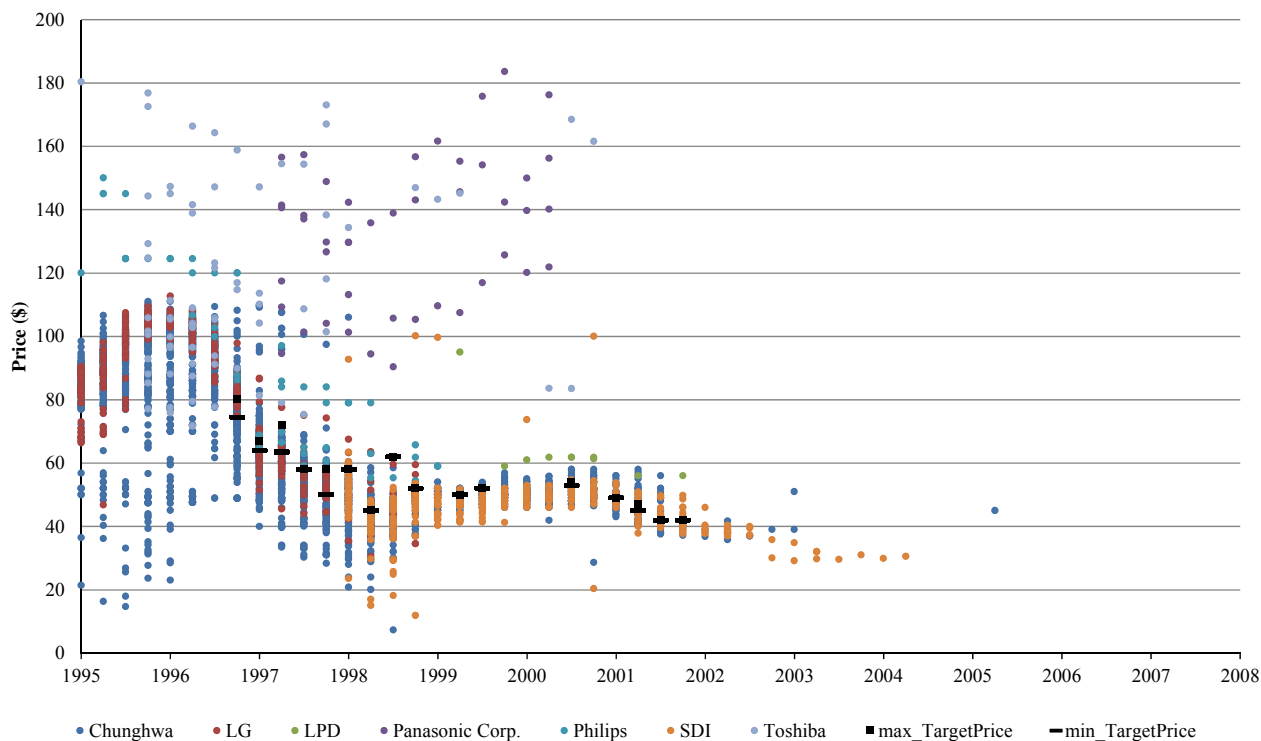
(3) The following observations were also excluded: (a) observations for which the application, model number, customer name, negotiated currency, or quarter were missing; (b) sales between integrated entities that sold CRTs; and (c) observations for which the price in the negotiated currency changed by less than 1% from the price in the previous quarter.

(4) A de minimis number of observations are outside the bounds of the y-axis;

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS

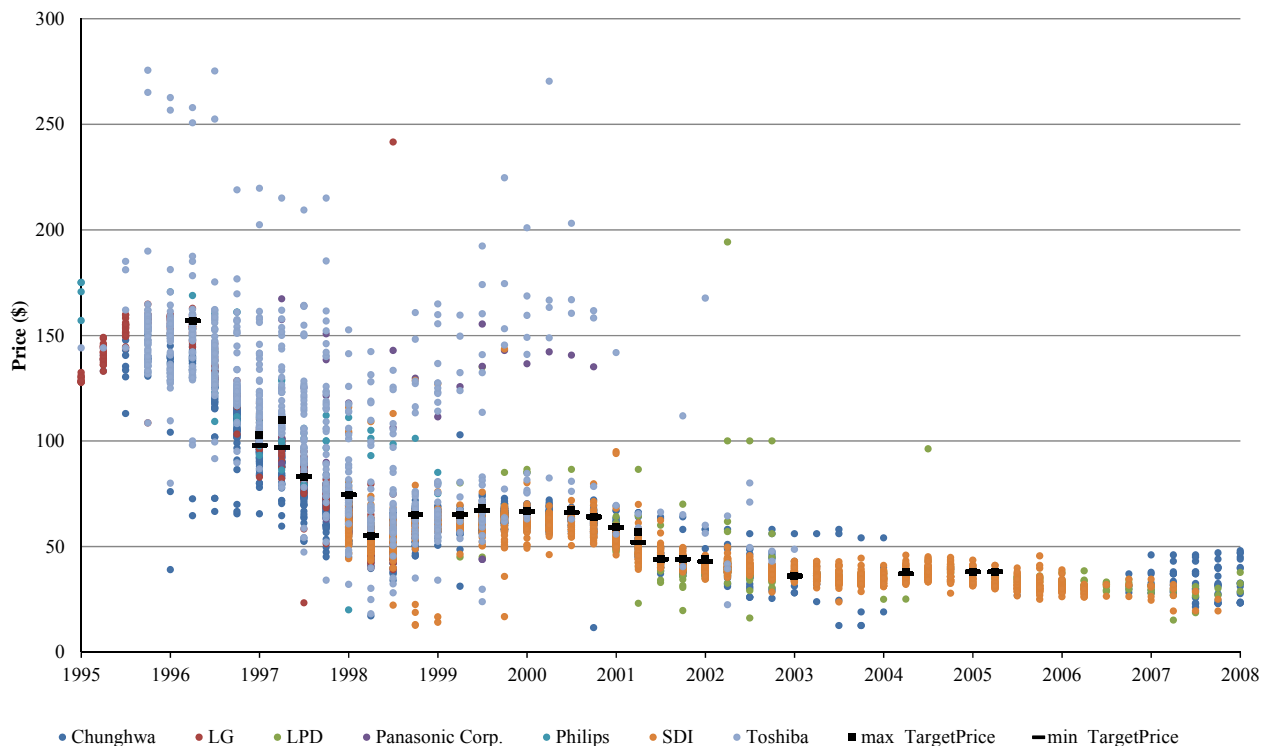
Figure 5B⁶

**14-Inch CDT with ITC Finish
Actual vs. Target Prices by Manufacturer**



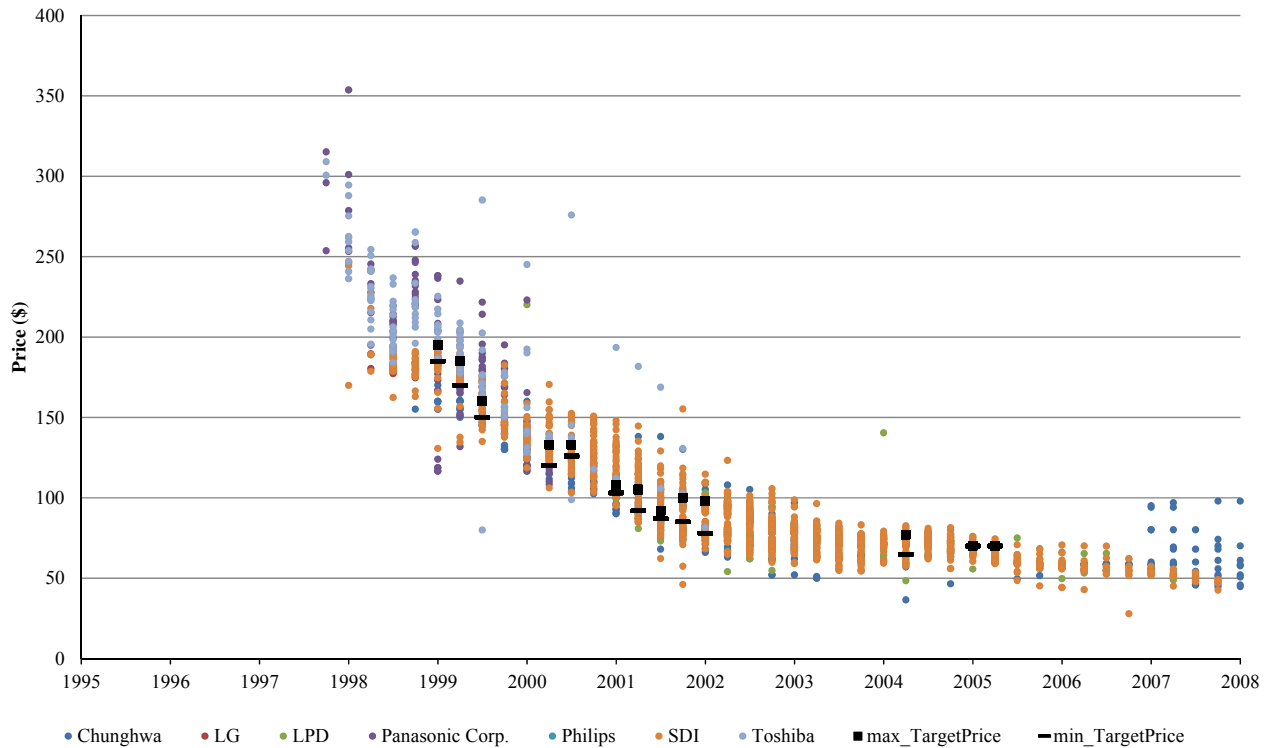
Note(s): Dr. Netz's sales database inappropriately labels Panasonic Corp. as MTPD. Actual prices aggregated by maker, size, customer, model, and finish.
 Data source(s): Defendant data; see Expert Report of Janet S. Netz, April 15, 2014, Exhibit 64.
 Source file(s): Cartel meeting notes; see Target price-structure.xlsx.
 PriceTracker.dta; all_defendants_dropexout_collapsed.dta; rebuttal_p010_p101_target_price_regressions.do - actual v target - max min.do

⁶ See my backup file "rebuttal_p010_p101_target_price_regressions.do - actual v target - max min.xlsx".

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS**Figure 5C⁷****15-Inch CDT with ITC Finish
Actual vs. Target Prices by Manufacturer**

Note(s): Dr. Netz's sales database inappropriately labels Panasonic Corp. as MTPD. Actual prices aggregated by maker, size, customer, model, and finish.
 Data source(s): Defendant data; see Expert Report of Janet S. Netz, April 15, 2014, Exhibit 64.
 Cartel meeting notes; see Target price-structure.xlsx.
 Source file(s): PriceTracker.dta; all_defendants_dropexout_collapsed.dta; rebuttal_p010_p101_target_price_regressions.do - actual v target - max min.do

⁷ See my backup file "rebuttal_p010_p101_target_price_regressions.do - actual v target - max min.xlsx".

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS**Figure 5D⁸****19-Inch CDT with ITC Finish
Actual vs. Target Prices by Manufacturer**

Note(s): Dr. Netz's sales database inappropriately labels Panasonic Corp. as MTPD. Actual prices aggregated by maker, size, customer, model, and finish.
 Data source(s): Defendant data; see Expert Report of Janet S. Netz, April 15, 2014, Exhibit 64.
 Source file(s): Cartel meeting notes; see Target price-structure.xlsx.
 PriceTracker.dta; all_defendants_dropexout_collapsed.dta; rebuttal_p010_p101_target_price_regressions.do - actual v target - max min.do

⁸ See my backup file "rebuttal_p010_p101_target_price_regressions.do - actual v target - max min.xlsx".

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS**Table 9A⁹****Regressions of Changes in Actual Prices on Changes in Target Prices**

Row	Dependent Variable	Independent Variables			Prices Not Matched Based on Shape			Prices Matched Based on Shape		
	Change in Actual Price (Level of Aggregation)	Change in Alleged Target Price (Level of Aggregation)	Change in Macroeconomic Variables	Change in Negotiated Price Currency-to-USD Exchange Rate Variables	Number of Observations	Estimated Coefficient on Change in Target Price	R-Squared	Number of Observations	Estimated Coefficient on Change in Target Price	R-Squared
1	Model, Customer, Factory, Quarter	Manufacturer, Application, Size, Finish, Shape (where applicable), Quarter			6,225	0.237***	0.126	528	0.424***	0.162
2	Model, Customer, Factory, Currency, Quarter	Manufacturer, Application, Size, Finish, Shape (where applicable), Quarter	X	X	6,116	0.215***	0.226	487	-0.0703	0.469

Sources:

(1) Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic Corporation, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba Corp.; (2) Netz target price data; (3) OECD StatExtracts Database (OECD unemployment rate and industrial production), Bank of Korea (Korean CRT glass PPI), DisplaySearch (worldwide monitor sales by technology), U.S. Federal Reserve (exchange rates).

⁹ See my backup file “CDT Regressions of Changes in Actual Prices on Changes in Target Prices.xlsx”.

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS

Notes for Regressions of Changes in Actual Price on Changes in Target Price

Notes:

(1) An actual price observation represents the quantity-weighted average actual price for a given model, factory, customer, and quarter (row 1) or for a given model, customer, factory, the currency in which the prices were negotiated ("negotiated currency"), and quarter (row 2) using global CDT sales data for Q1 1995 to Q4 2007;

(2) A target price observation represents the average of the CDT target prices identified by Dr. Netz for a given manufacturer, size, and finish (in addition to shape when applicable), ("group") and quarter, weighted by the number of days that the target price was effective during that quarter;

(3) Actual and target price changes represent the average quarterly percentage change (divided by 100) in the actual price for a given model, factory, and customer (and negotiated currency in row 2) and the average quarterly percentage change (divided by a hundred) in the CDT target price for the group between quarters t and $t-x$, where x is defined as the smallest positive integer (possibly equal to 1) for which there were actual prices for the model-factory-customer (and currency in row 2) and target prices for the group in quarters t and $t-x$. That is, the actual and target prices changes were calculated over the same period of time, and x represents the shortest period over which this was possible;

(4) Actual prices were excluded as outliers as follows: For each quarter in which a given CDT model produced in a given factory was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was produced in the same factory and sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, factory, customer, and quarter were excluded as outliers if: (a) the price for the model, factory, and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which the same model was produced in the same factory and sold to the same customer, or vice versa; (b) it was the first quarter in which the model was produced at that factory and sold to that customer and the price experienced a very large increase or decrease in the next quarter in which the model was produced at that factory and sold to that customer; or (c) it was the last quarter in which the model was produced in that factory and sold to that customer and the price experienced a very large increase or decrease from the previous quarter in which the model was produced in that factory and sold to that customer;

(5) The following actual price observations were also excluded: (a) observations for which the manufacturer, application, size, finish, model number, customer name, or quarter (or currency for the model presented in row 2 or shape when applicable) were missing; (b) sales between integrated entities that sold CRTs; and (c) observations with more than four quarters between observed pairs of actual price changes and target price changes.

* *Notes continued on next page.*

APPENDIX C: ADDITIONAL NOTES FOR SELECTED EXHIBITS AND ANALYSIS**Notes (Continued) for Regressions of Changes in Actual Price on Changes in Target Price**

Notes (continued):

(6) The macroeconomic variables included in the model presented in row 2 are: (a) the unemployment rate and industrial production for Organization for Economic Co-operation and Development ("OECD") countries; (b) the Korean CRT glass producer price index ("PPI"); and (c) the quarterly LCD share of worldwide monitor revenue. The changes in the Korean glass PPI and the OECD industrial production represents the average quarterly percentage change (divided by a hundred) in that variable between quarters t and $t-x$, where t and x are defined according to Note #3 above. The changes in the OECD unemployment rate and LCD market share represent the average quarterly percentage point change in that variable between quarters t and $t-x$;

(7) The exchange rate used in row 2 represents the ratio for quarter t between the average price in the negotiated currency and the U.S. dollar average price for a given model, factory, customer, and negotiated currency. The change in the exchange rate represents the percentage change (divided by a hundred) in the exchange rate between quarters t and $t-x$, where t and x are defined according to Note #3 above. The model presented in row 2 includes the change in the exchange rate and interactions between this variable and a series of seven "dummy" variables that take the value 1 if the currency in which the actual price was negotiated is the Deutsche Mark, Japanese Yen, South Korean Won, Malaysian Ringgit, Chinese Yuan, Taiwan New Dollar, or U.S. Dollar respectively, and zero otherwise. To avoid collinearity there is no dummy variable that equals 1 for prices negotiated in Brazil Real;

(8) (***) indicates that the estimated coefficient is different from zero at the 0.1% significance level.

EXHIBIT 40

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

IN RE: CATHODE RAY TUBE (CRT)
ANTITRUST LITIGATION

This document relates to:
ALL INDIRECT PURCHASER ACTIONS

Master File No. CV-07-5944-SC
MDL No. 1917

EXPERT SURREBUTTAL REPORT OF ROBERT D. WILLIG

11/06/14

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I. Introduction

1. I am a Professor of Economics and Public Affairs at the Woodrow Wilson School and the Economics Department of Princeton University, USA. I am also a Senior Consultant at Compass Lexecon, an economics consulting firm based in the U.S.
2. The Plaintiffs, a class of indirect purchasers (“IPPs”), allege that the manufacturers of color picture tubes (“CPTs”) and color display tubes (“CDTs”) acted in concert to elevate prices of CPTs and CDTs between March 1, 1995 and November 25, 2007 (the class period). I have been asked by counsel for several Defendants¹ to assess whether the economic analyses related to CPT damages provided by Dr. Janet Netz,² the economic expert for the IPP class, provide a reliable and sound basis to estimate damages to the IPP class. Pursuant to this assignment, I filed an expert report on August 5, 2014 (“Willig Damages Report” or “my initial damages report”).³
3. Since then, Dr. Netz has filed another expert report with opinions related to alleged CPT damages (“Netz Damages Rebuttal Report”).⁴ Counsel for Defendants have asked me to review and respond to the opinions and analyses contained in the new Netz

¹ I have been retained by Winston & Strawn LLP and Weil, Gotshal & Manges, LLP representing Panasonic Corporation of North America, MT Picture Display Co., Ltd., and Panasonic Corporation (f/k/a Matsushita Electric Industrial Co.); Kirkland & Ellis LLP representing Hitachi, Ltd., Hitachi Asia, Ltd., Hitachi America, Ltd., Hitachi Electronic Devices (USA), Inc., and Hitachi Displays, Ltd. (n/k/a Japan Display Inc.) (collectively, the “Hitachi Defendants” or “Hitachi”); White & Case LLP representing Toshiba America Consumer Products, L.L.C., Toshiba America Electronic Components, Inc., Toshiba America, Inc., Toshiba America Information Systems, Inc., and Toshiba Corporation; Sheppard, Mullin, Richter & Hampton LLP representing Samsung SDI America, Inc., Samsung SDI Co. Ltd., Samsung SDI (Malaysia) Sdn. Bhd., Samsung SDI Mexico S.A. De C.V., Samsung SDI Brasil Ltda., Shenzhen Samsung SDI Co., Ltd., and Tianjin Samsung SDI Co., Ltd.; and Baker Botts LLP representing Koninklijke Philips N.V., Philips Electronics North America Corporation, Philips Taiwan Limited, and Philips do Brasil Ltda.

² Expert Report of Janet S. Netz, Ph.D., April 15, 2014 (“Netz Damages Report”).

³ Expert Report of Robert D. Willig, August 5, 2014.

⁴ Expert Rebuttal Report of Janet Netz, September 26, 2014.

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Damages Rebuttal Report with respect to issues relevant for estimating alleged CPT overcharges.⁵

4. A list of matters in which I have given sworn testimony as an expert during the past four years, at trial or in deposition, is contained in Attachment 1. A list of the information and data I relied upon in forming the opinions expressed herein is contained in Attachment 2. My opinions expressed herein are based on those materials and data, my knowledge and experience in industrial organization economics and antitrust economics, my experience in antitrust enforcement at the U.S. Department of Justice, and my experience in advising and consulting with clients on competition matters over the past 35 years, both here and abroad.

5. The opinions expressed in this declaration reflect the information and facts I believe to be true at the time this declaration is filed. I reserve the right to revise my opinions if additional information and facts supplied in discovery or through subsequent expert reports and depositions make such revisions appropriate.

6. Compass Lexecon is being compensated for my work at my usual hourly rate of \$1,350, which is the same rate for research and testimony. This compensation is in no way connected to the outcome of this litigation.

II. Summary of Conclusions

7. I have reached the following conclusions in this matter:

- a) In my initial damages report, I explained that Dr. Netz's estimates of CPT overcharges are fundamentally unreliable because the model that she uses to estimate them does not properly control for changes in market conditions (such as changes in product quality) and because the model is unstable. As a result of these flaws, the overcharge estimated by Dr. Netz cannot distinguish between the price impact of changes in market conditions during the relevant period and any alleged impact of the putative cartel. Dr. Netz does not dispute this in her rebuttal report.

⁵ I have not addressed all issues noted in Dr. Netz's rebuttal reports because most have been addressed in my previous reports and testimony in the instant matter.

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- b) In my initial damages report I further explained that if, despite these fundamental flaws, Dr. Netz's model were to be used to estimate CPT overcharges, then her model should be modified to better control for changes in market conditions. Making reasonable modifications to her model (in the same spirit as her approach) to include relevant economic variables and to better control for changes in market conditions results in substantially smaller estimates of CPT overcharges than Dr. Netz's estimates. In her rebuttal report, Dr. Netz does not dispute that my inclusion of these additional market controls is consistent with economic reasoning, nor does she dispute that their inclusion in her model (but making no other changes to it) substantially reduces estimated overcharges.

Dr. Netz contends in her rebuttal report that it is unnecessary to add the market variables that I employ because her model without these variables already explains a high proportion of the variation in CPT prices and because these variables do not substantially improve the ability of her model to explain CPT price variation. However, the purpose of an overcharge model is not to explain CPT prices for its own sake, but rather to reliably determine the influence that the alleged cartel's activities had on CPT prices. My empirical findings demonstrate that much of the effect that Dr. Netz's model attributed to the cartel was, in fact, the influence that these omitted variables had on CPT prices. This showing is backed by the solid economic rationale for including these variables in Dr. Netz's CPT pricing model and by the fact that the data show they had a jointly statistically significant impact on CPT prices.

- c) When estimating overcharges, Dr. Netz assumes without support that the overcharge is uniform during the 12-year period between 1995 and 2006. I demonstrated in my initial damages report that removing this assumption and permitting overcharges to vary across years shows that there were no statistically significant overcharges after 1996. Moreover, it shows the average annual overcharge between 1995 and 2006 was far less than the overcharge estimated by Dr. Netz. In her rebuttal report, Dr. Netz provides no valid economic argument against the annual overcharge analysis. She just claims that I have provided no reasons to expect overcharges to vary across years during the Class Period. However, this is plainly incorrect since I have explained at length that market conditions changed considerably during the class period and the impact of the alleged cartel was consequently unlikely to have been uniform, contrary to Dr. Netz's assumption.
- d) In my initial damages report, I demonstrated that Dr. Netz's model estimates an overcharge for large CPTs that is statistically indistinguishable from zero, whereas the same model estimates a statistically significant overcharge for smaller CPTs. Dr. Netz does not dispute this finding in her rebuttal report. Nonetheless, Dr. Netz contends that because the overcharge for large CPTs estimated by her model is positive and because this estimate is the "best estimate" produced by her analysis, then even if it is not statistically significant, it follows that her analysis proves the alleged cartel impacted prices of large CPTs. However, when Dr. Netz's model is modified modestly

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to better control for changes in relevant market conditions, while still reflecting her modeling approach, the model estimates *negative* overcharges for large CPTs, whereas the same model estimates positive and statistically significant overcharges for small CPTs. I conclude that Dr. Netz's approach to estimating overcharges is therefore unable to establish that purchasers of large CPTs were impacted by the alleged cartel.

- e) In my initial damages report, I showed that when Dr. Netz's model of CPT overcharges is applied to CPTs sold in North America, her model estimates substantially smaller percentage overcharges for North American CPT sales than for global CPT sales. Dr. Netz contends that my estimates of North American CPT overcharges are not statistically distinguishable from her estimates of global CPT overcharges. However, the difference between them is economically important because it leads to a substantial difference in the estimated percentage overcharge. Furthermore, when minor modifications are made to Dr. Netz's overcharge model in order to control for North American market conditions (modifications that are entirely in the spirit of Dr. Netz's analysis), the model estimates overcharges in North America that are even smaller and statistically (and economically) distinguishable from Dr. Netz's estimate of global overcharges.
 - f) I explained in my initial damages report that Chunghwa's profit margins did not increase following the start of the alleged cartel in 1995, and this is inconsistent with Plaintiffs' claim of a highly effective cartel. In her rebuttal report, Dr. Netz contends that my measure of Chunghwa's profit margins improperly included the cost of asset depreciation. However, removing such costs both before and after 1995 does not alter my conclusion, i.e., there is no evidence that Chunghwa's profit margins increased after 1995. Dr. Netz makes several further arguments related to Chunghwa's profits, but none have any merit.
 - g) The observed heterogeneity of price dynamics among CPTs indicates that there were substantially heterogeneous market forces impacting the prices of various CPTs during the Class Period, and the presence of such market heterogeneity is inconsistent with the "price structure" claimed by Dr. Netz.
 - h) In my initial damages report, I demonstrated that the alleged cartel members' conduct was inconsistent with a sustained and effective CPT cartel, and in particular, that the alleged cartel members frequently deviated from the alleged target CPT prices. Dr. Netz asserts that one of my analyses of actual and target CPT prices is sensitive to the presence of data noise. However, she provides no empirical evidence that data noise presents a material issue. In contrast, I demonstrate empirically that her methodology for analyzing actual and target CPT prices is biased towards finding that cartel members adhered to the alleged target prices and therefore is incapable of distinguishing competitive outcomes from effective collusion.
8. Each of the above conclusions is explained in more detail in the rest of this report.

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III. Dr. Netz's Overcharge Estimates Are Unreliable.

A. Dr. Netz's Estimates of Global CPT Overcharges Are Fundamentally Flawed and They Over-Estimate CPT Overcharges.

9. In her damages report and in a subsequent errata filing, Dr. Netz used an econometric model to estimate that global CPT prices were, on average, elevated by 9% between 1995 and 2006, and by 3.1% in 2007 as a result of the conduct of the alleged cartel.⁶ As I explained in my initial damages report, Dr. Netz's analysis of overcharges is fundamentally unreliable for multiple reasons.⁷ In particular, Dr. Netz crucially assumes that her model of CPT overcharges includes all material economic determinants of CPT prices and also that the underlying relationships between the economic factors and CPT prices did not change materially during the 18-year estimation period. As such, she assumes that the only reason (after controlling for the included economic factors) that prices were higher during the class period is the alleged collusive conduct by manufacturers.

10. However, as I explained in my initial damages report, standard tests show that relationships between CPT prices and the economic variables included in Dr. Netz's model were not at all stable during the 18-year period, which is consistent with the dramatically changing market conditions for CPTs during the relevant period.⁸ Moreover, I also explained that the model excludes basic economic determinants of CPT prices – determinants such as product quality – that changed between the cartel and benchmark periods.⁹ For these reasons, Dr. Netz's model produces wholly unreliable estimates of overcharges resulting from the alleged collusive activities.

⁶ Netz Damages Report, p. 105; Errata to Netz Expert Report, July 3, 2014.

⁷ Willig Damages Report, §VIII and § IX.

⁸ *Id.*, § VIII A.

⁹ *Id.*

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11. Nonetheless, Dr. Netz maintains that her initial overcharge estimates are valid and reliable.¹⁰ She appears to base this assertion at least in part on her claim that she chose the alleged cartel period based on record evidence and that she relied on “case evidence and industry facts when determining reasonable control variables” (i.e., variables that account for industry demand and supply factors).¹¹ However, even if she were correct in these assertions, they do not address the fundamental problems with her economic model as noted in the previous paragraph and explained in considerable detail in my initial damages report. For example, Dr. Netz does not explain how an unstable model such as hers could isolate the impact of the alleged cartel on CPT prices and avoid conflating the impact of the alleged cartel with changes in market conditions. Nor does she provide any response to my view that her analysis fails to properly control for changes in product characteristics (such as the shift from curved to flat CPTs) which likely inflates her estimated overcharges.¹²

12. Even if one were to set aside the fundamental flaws of Dr. Netz’s overcharge model, as I explained in my initial report, making minor modifications to her CPT overcharge model in order to better control for changes in market conditions leads to estimated CPT overcharges that are much smaller than Dr. Netz’s estimates. This is further evidence of the lack of robustness of her analysis. Specifically, I demonstrated that adding to Dr. Netz’s analysis four market variables¹³ that economic logic indicates would be relevant

¹⁰ Netz Damages Rebuttal Report, pp. 60-62.

¹¹ *Id.*, pp. 56-57.

¹² At her deposition, Dr. Netz acknowledged that the mix of CRTs sold changed over time and that the change was relevant for her analysis. Specifically, she testified that relatively more flat and widescreen CRTs were sold over time and that these types of CRTs had higher prices (all else being equal). (Deposition of Dr. Janet Netz, June 27, 2014 (“Netz Initial Damages Deposition”), pp. 72-74.) Although she claimed that her analysis “indirectly” controls for changes in the product mix through the use of a trend variable in her regression, I have explained in my initial report why it fails to do so. (Willig Damages Report, fn. 92.) Dr. Netz has not addressed this critique in her rebuttal report.

¹³ The variables are: global shipping costs, Korean labor costs, Korean exchange rates and sales in U.S. electronic and appliance stores. (Willig Damages Report, pp. 51-52).

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for determining CPT prices (but otherwise keeping her model unchanged) reduces the estimated CPT overcharge during the 1995-2006 period from 9% to just 2.3%. The latter estimate is not statistically distinguishable from zero, although it is statistically distinguishable from the 9% overcharge estimate offered by Dr. Netz.¹⁴

13. As further explained in my initial damages report, although the addition of relevant economic variables to Dr. Netz's model of damages does not remedy the fundamental problems with her analysis, it does lead to a more reliable source of overcharge estimates because: (a) economic reasoning implies that these variables are likely determinants of CPT prices; (b) once added to Dr. Netz's regression, the estimated effect each of these variables had on CPT prices is consistent with economic logic; and (c) these estimated effects are jointly statistically significant at the 1% level.¹⁵

14. In her rebuttal report, Dr. Netz does not dispute that my inclusion of these additional market controls is consistent with economic logic, nor that the estimated effect each of these variables had on CPT prices is consistent with economic logic, nor that they are jointly statistically significant, nor that their inclusion in her model (but making no other change to it) substantially reduces estimated overcharges. Instead, she contends that it is unnecessary to add these variables because her model without these variables explains a high proportion of the variation in CPT prices and because these variables do not substantially improve the ability of her model to explain CPT price variation.¹⁶

¹⁴ In order to test whether the CPT overcharge estimates produced by my modifications to Dr. Netz's model are statistically significantly different from the overcharge estimates produced by Dr. Netz's regression, I used the Seemingly Unrelated Estimation (SUEST) procedure in STATA. The test rejects (at the 1% level of significance) the proposition that the overcharge estimate of 2.3% based on the modified version of Dr. Netz's model is statistically indistinguishable from the 9% overcharge estimate produced by Dr. Netz's model.

¹⁵ Willig Damages Report, § IX.

¹⁶ Netz Damages Rebuttal Report, p. 62. Dr. Netz also contends that the analysis should control for the cost of industrial energy usage since energy is a component of the cost of manufacturing CRTs. (*Id.*, pp. 61-62.) Including the energy cost index proposed by Dr. Netz in the modified version of Dr. Netz's model that was presented in my initial damages report lowers the resulting estimate of the CPT overcharge – from 2.3% to 1.7% for the 1995-2006 period. (See Exhibit 1.)

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15. As an initial matter, it is important to note that Dr. Netz does not deny that the additional market variables I include improve the performance of her model; she merely contends that they do not improve the model's performance *a lot*. Consequently, she holds fast to her view that her original estimate of CPT overcharges is reliable.¹⁷

16. This is an untenable conclusion for two reasons. First, the purpose of an overcharge model is not to explain the variation in CPT prices for its own sake, but rather to reliably determine the influence that the alleged cartel's activities had on CPT prices. My empirical findings demonstrate that much of the effect that Dr. Netz's model attributed to the cartel was, in fact, the influence that the omitted variables had on CPT prices. This showing is backed by the solid economic rationale for including these variables in a CPT pricing analysis and by the fact that the data show they had a jointly statistically significant impact on CPT prices within the context of Dr. Netz's model.

17. The fact that the addition of relevant market controls that are statistically significant leads to a substantial change in estimated overcharges is clear evidence that Dr. Netz's model is misspecified and that her overcharge estimate is unreliable. An American Bar Association (ABA) treatise on estimating antitrust damages explains the problem as follows:

If these additional explanatory variables [added to a regression analysis based on economic reasoning] turn out to be statistically significant and the coefficient estimates on the previously included explanatory variables [such as the cartel indicator variable] change substantially when the additional variables are added, then the regression model that omitted the additional explanatory variables likely is misspecified and its results are biased and unreliable.¹⁸

18. In the context of Dr. Netz's model, the omission of variables such as shipping costs that economic reasoning suggests should be included in the analysis, together with the

¹⁷ *Id.* ("22.0% and 9.0% are reasonable measures of the direct overcharge imposed on CDTs and CPTs, respectively.")

¹⁸ ABA Section of Antitrust Law, "Proving Antitrust Damages: Legal and Economic Issues," (2D ED. 2010), p.154.

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substantial reduction in the overcharge estimate when such variables are added to Dr. Netz's analysis, constitute plain evidence that her estimates of overcharges are biased and unreliable.

19. The ABA treatise further notes that “[G]enerally speaking, one should exercise great care if potentially important variables are to be excluded from a model...It is rarely advisable to drop a theoretically important variable, especially if its coefficient is statistically significantly different from zero. Similarly, one generally should not drop a group of theoretically important variables when their coefficients are jointly statistically significantly different from zero (even if they are individually not statistically significantly different from zero).”¹⁹ Consistent with this view, it is my opinion that the market variables that I have added to Dr. Netz's model properly belong there since economic reasoning indicates that they are relevant for CPT pricing and because the data show that they are jointly statistically significantly different from zero.

20. Second, in rejecting these additional market variables, Dr. Netz provides no objective basis and cites to no statistical standards of model performance that would have to be satisfied in order to include or exclude economically relevant market variables. She merely notes that the addition of these variables improves one particular metric of model performance (the adjusted R-squared statistic) by only 0.06%. However, for the reasons discussed above, I do not believe that this is a proper basis for excluding these variables.²⁰ Moreover, Dr. Netz includes in her analysis market controls that increase the adjusted R-squared statistic by even less than the ones that I have added. For example, Dr. Netz includes the GDP of OECD economies in her overcharge model as a control for CPT demand conditions even though the addition of this variable increases the adjusted

¹⁹ *Id.*, p. 177.

²⁰ In particular, the inclusion of additional market controls for which there is a theoretical and empirical basis for believing had a material effect on CPT prices improves the accuracy of the estimate of how specific variables that were already included in the regression – such as the indicator variable used by Dr. Netz to estimate the alleged cartel's impact – affected CPT prices. This is so even if a model that includes those additional controls does not explain a substantially larger share of the variation in CPT prices, as measured by the adjusted R-squared statistic.

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R-squared statistic by just 0.01%. Thus, whatever unsupported standard Dr. Netz has in mind to determine which market variables should be included in her overcharge analysis, she has not applied it in a consistent manner.

21. In sum, I conclude that because the economic variables that I have added to Dr. Netz's overcharge model are economically relevant to CPT prices from Dr. Netz's own theoretical perspective and from the empirical standpoint, their inclusion leads to a more reliable estimate of the overcharges than the one presented by Dr. Netz, even though it does not remedy the fundamental problems with her analysis.

B. Dr. Netz's Overcharge Analysis Fails to Demonstrate Classwide Impact of the Alleged Cartel.

22. Dr. Netz's approach assumes that the alleged cartel uniformly elevated CPT prices in each year between 1995 and 2006, and it estimates a single average overcharge for that period. As I explained in my initial damages report, when Dr. Netz's overcharge model is modified to remove the assumption of a uniform overcharge each year and it is allowed to estimate different overcharges in each year of the class period, I find that it is unable to establish statistically significant positive overcharges for CPTs sold after 1996.

Similarly, when her model is modified to remove the assumption of uniform overcharges for large and small CPTs during the alleged cartel period and it is allowed to estimate different overcharges for large and small CPTs, it fails to establish statistically significant overcharges for large CPTs during the length of the claimed cartel period.²¹ These results are inconsistent with Dr. Netz's claim that the alleged cartel's conduct had classwide impact.

23. In response, Dr. Netz first contends that I provided no justification for estimating overcharges annually.²² This is demonstrably incorrect since I explained at length in my initial damages report (as well as in the two reports that I submitted during the class certification phase of the instant litigation) that market conditions changed materially

²¹ Willig Damages Report, § VII.

²² Netz Damages Rebuttal Report, pp. 55-57

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during the nearly 13-year class period in ways that would have affected the effectiveness of the alleged cartel over time. The putative cartel likely was less effective in certain time periods than in others. For example, I described the advent of LCD competition in the later years of the class period and the likelihood that such competition would have limited the ability of the putative cartel to elevate prices.²³ I further noted that according to data compiled by Dr. Netz, target prices were being set for very few CPTs in the early years of the class period.²⁴ As such, the record evidence is entirely consistent with the view that the impact of the alleged cartel could have varied over time.

24. Dr. Netz acknowledges that she has not provided any empirical tests to determine how the impact of the putative cartel varied across time during the class period (other than between 2007 and the combined 1995-2006 period).²⁵ Consequently, nothing in Dr. Netz's overcharge estimation model rules out the possibility that the alleged cartel had no impact on CPT prices in certain years. Moreover, Dr. Netz acknowledges that the alleged cartel's impact on CRT prices could have varied across different years of the alleged cartel period (within the 1995-2006 period as well as between those years and 2007), for example, due to the increasing intensity of LCD competition over time.²⁶ Dr. Netz further acknowledges that it is possible that the putative cartel did not impact CPT prices in certain class years.²⁷ These acknowledgements provide a clear rationale for revising Dr. Netz's model in a way that allows the estimate of the alleged cartel's impact on CPT prices to vary during the 1995-2006 period.

²³ Willig Damages Report, § IV A.

²⁴ *Id.*, § VII B and § VIII B. I also noted in the same sections of my initial damages report that Dr. Netz's damages report failed to cite to any claimed agreements related to CPT supply reductions that occurred prior to 1998.

²⁵ Netz Damages Rebuttal Deposition, p. 27.

²⁶ Deposition of Dr. Janet Netz, October 31, 2014 ("Netz Damages Rebuttal Deposition"), pp. 23-6; 31-5 (rough transcript). Dr. Netz acknowledges that LCD competition constrained the ability of the alleged cartel to elevate CRT prices. (Netz Damages Rebuttal Deposition, p. 36, and Netz Damages Rebuttal Report, fn. 3.)

²⁷ Netz Damages Rebuttal Deposition, pp. 31-33.

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25. In addition to the lack of impact in most years of the class period, Dr. Netz's model also finds little evidence of cartel impact when applied separately to large CPTs. In my initial damages report, I noted that Dr. Netz estimates a single overcharge for CPTs of different sizes,²⁸ and showed that when her model is modified to remove the assumption of equal overcharges for large and small CPTs and permit different overcharge estimates for large (CPTs that have a 26-inch diagonal or larger) and small CPTs, it produces statistically significant overcharge estimates for small CPTs, but not for large CPTs.²⁹

26. In her rebuttal report, Dr. Netz does not dispute this finding. However, she contends that the estimated overcharge for large CPTs (3.9%) is the "best estimate" of cartel impact, and thus, although this estimate is not statistically distinguishable from zero, the fact that it is positive implies that the alleged cartel impacted prices of large CPTs as well as prices of smaller CPTs.³⁰

27. However, as I have explained in this report and in my initial damages report, Dr. Netz's model of CPT overcharges omits relevant market variables. I demonstrated in my initial damages report that making minor modifications to her model to include relevant economic variables and better control for changes in market conditions produces much smaller estimates of overcharges for all CPTs. When this modified version of Dr. Netz's model is applied to only large CPTs, it produces overcharge estimates that are negative and not statistically different from zero for the 1995-2006 period and statistically significant negative overcharges in 2007.³¹ (See Exhibit 2.) The fact that this estimate is

²⁸ In her rebuttal report, Dr. Netz claims that her overcharge model captures the effects of CPT size by allowing the impact of glass costs on CPT prices to depend on the size of the CPT and by including dummy variables for each manufacturer and CPT size. (Netz Damages Rebuttal Report, p. 59.) While these variables may help her explain the variation in CPT prices, Dr. Netz does not dispute the fact that the model she presents estimates a single set of overcharges (1995-2006 and 2007) for all CPT sizes, and thus is incapable of determining whether the overcharge differed across CPT sizes or of showing that there was a uniform overcharge for all CPT sizes.

²⁹ Willig Damages Report, § VII A.

³⁰ Netz Damages Rebuttal Report, p. 59.

³¹ In her rebuttal report, Dr. Netz contends that I acknowledged in my deposition that the manner in which I "split up the data" (i.e., the fact that I split data for large CPTs from small CPTs and I

(footnote continued ...)

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negative should not be taken as evidence that the alleged cartel lowered CRT prices; more likely it results from the fundamental flaws in Dr. Netz's model described in my initial damages report and above. However, the fact that the "best estimate" resulting from the addition of several economically reasonable market controls to Dr. Netz's model produces a negative overcharge estimate for large CPTs strongly suggests that the alleged cartel's conduct had limited or no impact on large CPT prices. At a minimum, Dr. Netz has not validly demonstrated any impact on large CPT prices.³²

(... footnote continued)

estimated Dr. Netz's regression model separately for each group) "could have been a factor in the results [overcharges for large CPTs] not being statistically significant." (Netz Damages Rebuttal Report, p. 59) However, I also noted at my deposition that while conceivably that could be the case, there "was no evidence [of it] here." (Willig Deposition, 246:13-4) Indeed, the lack of statistical significance of the estimated overcharge for large CPTs is not due to a lack of data. I estimated the large CPT overcharge regression using a dataset with 1,135 observations. This is not much smaller than the dataset that I used to estimate overcharges for smaller CPTs (1,439 observations), and the model estimates a positive and statistically significant overcharge for smaller CPTs (see Exhibit 2).

Separating data on large and small CPTs is appropriate when estimating overcharges for large and small CPTs. This is the proper approach given the record evidence related to differences in market conditions between large and small CPTs. Consistent with this view, a standard statistical test (Chow test) rejects the proposition that a single pricing model should be estimated for large and small CPTs. The test is conducted as follows: I first interact a dummy variable for large CPTs (which equals 1 for large CPTs and equals zero otherwise) with each of the control variables in Dr. Netz's model. I then include these interaction variables in Dr. Netz's model, estimate the extended model, and then test the joint hypothesis that the coefficients of these interaction variables equal zero. The hypothesis is rejected at the 1% significance level. A similar test conducted on extensions to Dr. Netz's model noted in Exhibit 2 leads to the same conclusion, i.e., the joint hypothesis that the coefficients of these interaction variables equal zero is rejected at the 1% significance level. Hence I conclude that a single pricing model should not be estimated for large and small CPTs.

³² As shown in Exhibit 2, when Dr. Netz's model is used to estimate overcharges separately for large and small CPTs and the separate estimates are then averaged based on the revenue shares of large and small CPTs to obtain an overall CPT overcharge estimate, I find that the average overcharge for all CPTs is 7.1% for the 1995-2006 period instead of the 9% overcharge estimated by Dr. Netz. Furthermore, when the modified version of Dr. Netz's model (with additional market control variables) is used to estimate overcharges separately for large and small CPTs, and the separate estimates are then averaged based on the revenue shares of large and small CPTs, I find that the average overcharge for all CPTs is 1.9% for the 1995-2006 period

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C. Dr. Netz Has Failed to Establish that Her Estimates of Global CPT Overcharges Are a Reliable Estimate of North American CPT Overcharges.

28. In my initial damages report I explained that Dr. Netz assumes that her global CPT overcharge estimate applies (through claims of pass-through) to TV purchases by members of the U.S.-based IPP class. I further explained that this assumption is unlikely to be valid because there are sound economic reasons to conclude that the North American CPT marketplace differed in material ways from the rest of the world, and hence the impact of the putative cartel on the prices of CPTs in TVs sold in North America likely would not have been the same as the impact of the putative cartel globally.³³

29. Moreover, I showed in my initial damages report that when Dr. Netz's model of CPT overcharges is applied to CPTs sold in North America, her model implies a substantially smaller overcharge for North American CPT sales than the overcharge she estimates for global CPT sales. Specifically, Dr. Netz's model estimates a 5.1% overcharge for North American CPT sales during the entire alleged cartel period (and 5.2% for the 1995-2006 period), whereas her model estimates an 8.9% overcharge for *global* CPT sales the entire alleged cartel period (and 9% for the 1995-2006 period).³⁴ This differential between North American and global overcharges is consistent with the fact that conditions in the North American CPT marketplace differed from the rest of the world, and in particular with the fact that the alleged cartel's target price setting activity identified by Dr. Netz was less prevalent for the mix of CPTs sold in North America.

(... footnote continued)

instead of the 9% overcharge estimated by Dr. Netz. (For the purposes of calculating the weighted average overcharge, I zero out the negative overcharge estimate for large CPTs in 1995-2006.) (The estimated average all-CPT overcharge for 2007 is 3.1% according to Dr. Netz's model but the overcharges for 2007 are negative when the modified version of Dr. Netz's model is used to estimate overcharges separately for large and small CPTs. See Exhibit 2.)

³³ Willig Damages Report, § VIII D.

³⁴ *Id.*, ¶ 98.

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30. In her rebuttal report, Dr. Netz contends that although her model produces an overcharge estimate that is 74% higher when it is applied to global CPT sales than when it is applied to North American CPT sales (8.9% vs. 5.1%), these estimates are “statistically indistinguishable.”³⁵ However, the fact that they are “statistically indistinguishable” simply means that one cannot reject the *possibility* that the North American and global CPT overcharge were the same. This does not change the fact that, according to Dr. Netz’s model, the *best* estimate of the overcharge for CPTs sold in North America is 5.1%, and the overcharge on CPTs sold in North America is likely to be more relevant for estimating the impact on the U.S.-based IPP class.

31. Further evidence of a differential cartel impact in North America is revealed by minor modifications to Dr. Netz’s overcharge model that are entirely in the spirit of Dr. Netz’s analysis. Specifically, Dr. Netz includes in her model the Gross Domestic Product (GDP) and the unemployment rate in OECD economies because they are demand factors that affect the price of CPTs sold globally. Similarly, Dr. Netz includes the cost of specialty glass in South Korea as a proxy for global CPT manufacturing costs. However, since a substantial majority of CPTs sold in North America were manufactured in North America during the relevant period, and market conditions in North America differed from the rest of the world for reasons explained in my initial damages report,³⁶ economic logic and common sense indicate that North American economic conditions would also have affected prices of CPTs sold in North America. Consequently, I conduct an analysis wherein I apply Dr. Netz’s model to North American data with the following four variables added to her model: U.S. GDP, the U.S. unemployment rate, the market share of LCD TVs in North America, and the cost of specialty glass in the U.S. Each of these variables is the U.S. counterpart of the global market variables used by Dr. Netz. The addition of these variables is entirely consistent with Dr. Netz’s approach.

³⁵ Netz Damages Rebuttal Report, p.63.

³⁶ Willig Damages Report, ¶ 96.

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32. As seen in Exhibit 3, when Dr. Netz's CPT overcharge model with the four additional North America-specific market variables is applied to North American CPT sales data (but otherwise leaving Dr. Netz's model unchanged), the estimated overcharge in North America during the 1995-2006 period is just 2.0%, which is statistically distinguishable at the 1% level from Dr. Netz's global overcharge of 9% for the same period.³⁷

Moreover, the North American overcharge is not statistically distinguishable from zero, i.e., one cannot reject the possibility that there was no impact of the alleged cartel on North American CPT prices. Thus, although the "best estimate" of the alleged cartel's impact on prices of CPTs sold in North America is positive, the findings in Exhibit 3 are clearly inconsistent with Dr. Netz's claim that the alleged cartel had identical impacts in North America and elsewhere in the world.³⁸ The estimated overcharges in North

³⁷ In order to test whether the CPT overcharge estimates produced by the modified Netz model in North America are statistically significantly different from the overcharge estimates from Dr. Netz's regression, I used the Seemingly Unrelated Estimation (SUEST) procedure in STATA. The test rejects (at the 1% level of significance) the proposition that the overcharge estimate of 2.0% based on the modified version of Dr. Netz's model during the 1995-2006 period as applied to North American data is statistically indistinguishable from the 9% global CPT overcharge estimate produced by Dr. Netz's model for the same period. The same conclusion applies to the estimated overcharges for 2007. The modified version of Dr. Netz's model includes the four additional variables listed above. For example, U.S. GDP is included and the OECD GDP variable employed by Dr. Netz is also included. The modified model is estimated using only data on North American sales of CPTs, whereas Dr. Netz's model is estimated using global CPT sales data.

³⁸ In her rebuttal report, Dr. Netz further claims that her worldwide estimates of overcharges are more reliable than estimates of North American overcharges produced by applying her model to just North American CPT sales because the latter estimates are based on "only" 1,314 observations, whereas her global overcharge estimates are based on 2,574 observations. (Netz Damages Rebuttal Report, p. 63.) As an initial matter, the North American CPT sample is larger than the dataset that Dr. Netz used to estimate CDT overcharges, which contains 1,134 observations. More importantly, if Dr. Netz's claim is that her *worldwide* CPT overcharge estimate is more reliable as an estimate of *North American* CPT overcharges than estimates based only on North American data because there are more global data than North American data, then her argument assumes what she needs to prove, i.e., that despite the evident differences in CPT market conditions between North America and much of the rest of the world, the cartel had a similar impact in both regions. If, however, the impact of the alleged cartel in North America differed from the impact in the rest of the world, estimating the North American impact based in large part on data from the rest of the world would produce distorted and

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America are statistically and economically distinguishable from overcharges estimated globally by Dr. Netz's model.

33. In sum, Dr. Netz's rebuttal report does not alter my conclusions that (a) her estimates of overcharges are unreliable; (b) reasonable modifications to Dr. Netz's analysis within the confines of her approach substantially reduce her overcharges estimates; and (c) her own approach demonstrates the absence of class-wide impact of the alleged cartel.

IV. Evidence on Profit Margins Does Not Support the Claim of a Highly Successful Cartel.

34. I explained in my initial damages report that Chunghwa's profit margins are inconsistent with Plaintiffs' claim of a highly effective cartel.³⁹ Chunghwa has no CPT-specific gross margin data that would permit a comparison of its CPT gross profit margins during the alleged cartel period with its margins outside the cartel period. However, Chunghwa's financial statements show that its overall gross profit margins from all *CRT* (combining CPTs with CDTs) sales did not increase following the start of the alleged cartel in 1995. In fact, Chunghwa's average annual CRT gross margins were *lower* in the six years immediately after the start of the alleged cartel (1995-2000) than in the six years immediately prior to the start of the alleged cartel period (1989-1994).⁴⁰

35. In response, Dr. Netz claims that I based my opinions related to the impact of the alleged cartel on Chunghwa's gross profit margins merely on the observation that Chunghwa's gross profit margins declined during the cartel period.⁴¹ This is false. As noted above, I compared Chunghwa's gross profit margins after the alleged cartel began

(... footnote continued)

unreliable results notwithstanding the larger sample size. The global estimates are a blend of the cartel impacts in North America and the rest of the world.

³⁹ Chunghwa is the only major CRT manufacturer for which I have been able to locate consistent data on CRT-specific gross profit margins for cartel and non-cartel periods.

⁴⁰ Willig Damages Report, pp. 32-3.

⁴¹ Netz Damages Rebuttal Report, pp. 52-3.

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in 1995 with its margins in the years immediately *before* 1995. If Dr. Netz were correct in her claim that the alleged cartel elevated CDT prices by as much as 20% and CPT prices by 9% starting in 1995, then the impact of such price elevations should be readily apparent in Chunghwa's recorded profits. The lack of any evidence that Chunghwa's recorded gross profit margins increased after the cartel began is inconsistent with Dr. Netz's claim of a highly successful cartel.

36. Furthermore, Dr. Netz objects to the inclusion of depreciation costs in my analysis.⁴² However, she provides no evidence that the treatment of depreciation costs changed over time in a manner that would diminish Chunghwa's margins during the years immediately after 1995 relative to its margins prior to 1995. In other words, Dr. Netz provides no evidence that the treatment of depreciation costs determined the conclusion that I reached in my report, i.e., that CRT profit margins were lower after 1995 (between 1995 and 2000) than before (between 1989 and 1994).

37. In fact, I find that even if Chunghwa's depreciation costs are removed from the calculation of gross profit margins reported in Chunghwa's financial report, there is no evidence that its gross margin increased after 1995. Specifically, after excising depreciation costs, Chunghwa's average annual CRT gross profit margin declined from 24.3% during the six years immediately prior to the start of the alleged cartel period (1989-1994) to 23.5% during the six years immediately after the start of the alleged cartel (1995-2000).⁴³

⁴² Netz Damages Rebuttal Report, p.68.

⁴³ CRT margin data are from Chunghwa's annual reports which record annual gross margins. (Chunghwa annual reports and certified translations, 1990-2000.) No data for years prior to 1989 are available. The analysis noted here compares unweighted mean gross margins before and during the cartel period. However, weighting the annual gross margins (without depreciation costs) by annual Chunghwa revenues and comparing weighted means does not alter the conclusion that the average gross margin was lower in the cartel period. Moreover, extending the analysis to include all years of the alleged cartel (instead of 1995-2000) does not alter the conclusion that the average gross margin during the alleged cartel period was lower than in the years prior to 1995.

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38. In addition to demonstrating that Chunghwa's profit margins did not increase following the advent of the alleged cartel, I also showed in my initial damages report that the CRT overcharges estimated by Dr. Netz imply that Chunghwa would have operated at a loss in the but-for world posited by Dr. Netz.⁴⁴ To see why this finding demonstrates the implausibility of Dr. Netz's overcharge estimates, it is important to note that her analysis assumes that CRT manufacturers would have readily supplied the additional CRTs demanded by customers in the but-for world in response to the substantially lower CRT prices in the but-for world claimed by Dr. Netz. However, if CRT manufacturers would have faced sustained losses year after year in the but-for world because of the sharply lower but-for prices claimed by Dr. Netz, then economic logic and common sense indicate that their reactions to such losses likely would have reduced the supply of CRTs below the levels implicitly assumed by Dr. Netz, thus elevating but-for world prices above what she assumes.

39. For example, as noted in my initial damages report, although Chunghwa invested over \$600 million in CRTs between 1999 and 2006 in the actual world, if it had faced sustained losses in the but-for world of Dr. Netz, it is likely that Chunghwa would not have made such investments at all or would have reduced them, thereby reducing its supply of CRTs. Such reductions in but-for supply likely would have put upward pressure on but-for prices, a factor that is not accounted for in Dr. Netz's overcharge model, thereby inflating overcharges estimated by her.

40. In response to my critique, Dr. Netz makes several (flawed) arguments:

- a) First, Dr. Netz claims that it is improper to include overhead costs such as sales and administrative costs and R&D costs in an economic analysis of CRT manufacturers' supply decisions because manufacturers would not exit the industry as long as they could recover their variable costs.⁴⁵ This logic does not apply to decisions about new investments such as the ones made by Chunghwa. Economic logic indicates that a new investment would make economic sense only if investors expected revenues from the investment to

⁴⁴ Willig Damages Report, §VIII.C.

⁴⁵ Netz Damages Rebuttal Report, p. 66.

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exceed variable costs (i.e., costs that change with output), fixed costs associated with the investment, taxes, and the opportunity cost and depreciation cost of invested capital. My analysis of Chunghwa's financial records shows that the but-for CRT prices estimated by Dr. Netz imply that Chunghwa's but-for CRT net operating income (i.e., revenues net of variable costs, fixed costs such as sales and marketing costs, R&D costs and depreciation costs) would have been negative every year between 1999 and 2006, and the mean annual but-for CRT net operating profit margin would have been -15.6% during this period.⁴⁶ Thus, Chunghwa would have incurred consistent losses in the but-for world posited by Dr. Netz, which is why it is implausible that Chunghwa would have invested as it actually did in such a scenario. Even these estimated losses likely under-estimate the extent of Chunghwa's losses in the but-for world because they do not fully account for Chunghwa's opportunity cost of capital.

- b) Second, Dr. Netz contends that accounting data can be misleading in economic analyses of firms' decision making.⁴⁷ However, the reliability of accounting data used in economic analyses depends on the purpose of the analysis. For example, as described above, I have used accounting data on Chunghwa's gross profit margins to assess whether such margins increased following the start of the alleged cartel in 1995. If Dr. Netz were correct in her claim that Defendants were able to increase prices substantially above their but-for levels starting in 1995, I expect Chunghwa's accounting data would reflect an increase in CRT profit margins. The absence of any evidence of an increase in gross profit margins at Chunghwa following the start of the alleged cartel is inconsistent with Dr. Netz's claim of a highly effective cartel.

Although Dr. Netz raises concerns about the reliability of accounting data related to the measurement of depreciation costs,⁴⁸ even when Chunghwa's

⁴⁶ Net operating profits are revenues net of the following types of costs: cost of goods sold, sales and general administrative costs, research and development costs, and depreciation and amortization costs. The but-for CRT operating margins for Chunghwa in each year are obtained by first reducing Chunghwa's actual CRT revenues in that year by Dr. Netz's estimated overcharges. I next subtract the cost categories listed above from but-for CRT revenues. Finally, this but-for net operating profit estimate is divided by the but-for amount of sales to obtain the but-for CRT net operating margin. Actual CRT net operating margins during the 1999-2006 period were positive in all but one year (2006), and the mean actual annual net CRT operating margin was 5.3%. (The annual reports by Chunghwa do not record data on capital expenditures separately for CPTs and CDTs. Capital expenditure data prior to 1999 are unavailable.) The data to calculate this measure are available in Chunghwa Picture Tubes annual reports. I use the latest available data for each year.

⁴⁷ Netz Damages Rebuttal Report, pp. 71-2.

⁴⁸ Netz Damages Rebuttal Report, pp. 71-72.

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gross profit margins are calculated without accounting depreciation costs, there is no evidence of an increase in such margins with the advent of the alleged cartel in 1995 (as noted above). Moreover, even assuming *arguendo* that Chunghwa's depreciation and amortization costs were zero, Dr. Netz's estimated but-for prices imply that Chunghwa's but-for operating margins for CRTs would have been negative in all but two years between 1999 and 2006. Specifically, I estimate that its mean annual CRT but-for operating margin assuming zero depreciation and amortization costs would have been -5.6% during this period.⁴⁹ (This analysis underestimates Chunghwa's implied losses because it is not plausible that Chunghwa's depreciation costs are zero and because the analysis excludes the opportunity cost of capital. Both of these costs would have been factored into Chunghwa's decisions about new investments.) Thus, the concerns raised by Dr. Netz about the reliability of accounting data related to the measurement of depreciation costs fail to alter the conclusions of my economic analysis of Chunghwa's financial data.⁵⁰

- c) Third, Dr. Netz contends that in the but-for world she posits some firms would have sustained consistent losses and even exited the marketplace earlier than they did in the actual world. However, in her view, other, more efficient manufacturers would have increased their supply of CRTs and in the process would have reduced their costs due to scale economies. The net effect, in her opinion, would have been an expansion of industry-wide CRT supply that would have been sufficient to satisfy the increased CRT demand produced by lower CRT prices in the but-for world without increasing unit costs.⁵¹ However, Dr. Netz provides no empirical evidence needed to support any of

⁴⁹ I calculate this measure by removing depreciation and amortization costs in the calculation of net operating profit, as described in *supra* note 46. The data required for this calculation are available in Chunghwa Picture Tubes annual reports. I use the latest available data for each year.

⁵⁰ Dr. Netz also contends that returns on already invested capital are irrelevant for assessing returns on future investments and the feasibility of such investments. In other words, even if Chunghwa's capital already invested by 1999 were unprofitable, it may nonetheless have been profitable to make further investments since these additional projects may have been profitable. (Netz Damages Rebuttal Report, p. 72.) However, in the but-for world posited by Dr. Netz, Chunghwa would have had negative cash flows as evidenced by the fact that it would have had negative operating margins without depreciation costs. As such, Chunghwa would have had to look to capital markets to finance its investments in the but-for world. Basic economic common sense indicates that it would have been difficult for a firm suffering consistent losses and facing declining demand for its products to have raised capital to make additional investments. Certainly, Dr. Netz has provided no evidence to the contrary.

⁵¹ Netz Damages Rebuttal Report, p. 68.

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these claims. As such, her argument remains speculative.⁵² The fact remains that in the actual world, CRT manufacturers sustained losses that forced many to exit the business or scale back investments. For example, LPD, one of the two largest CPT manufacturers between 2000 and 2005, declared bankruptcy in early 2006.⁵³ It is highly likely that it would have exited the industry even earlier or at least would have invested less in the but-for world posited by Dr. Netz, in which prices and margins would have been substantially lower than in the actual world. The resulting loss of CRT supply likely would have elevated but-for prices above the levels estimated by Dr. Netz.

41. In sum, I conclude that the available information on CRT profit margins is inconsistent with Dr. Netz's claim of a highly effective cartel, and it illustrates the implausibility of her overcharge estimates.

V. No Plausible Evidence of a "Price Structure"

42. Dr. Netz's conclusion of classwide impact rests heavily on her claim that CPT prices exhibited a "price structure" such that "prices of different types are related to each other via product characteristics, and therefore setting a target price increase for one type of CPT implies a price increase for other CPTs."⁵⁴ In my initial damages report, I explained that price differences among CPTs of various sizes changed substantially over time, and

⁵² Although Dr. Netz refers to scale economies in CRT manufacturing, she makes no attempt to quantify scale economies or to establish that they are material. The fact that the CPT industry was unconcentrated during the relevant time period (for example, between 2000 and 2006, the Herfindahl-Hirschman Index (HHI) of global CPT production concentration varied between 1,200 and 1,400) is not consistent with the existence of substantial economies of scale beyond what industry participants had already achieved.

⁵³ Fredenburgh, Catherine, "U.S. Unit of LG.Philips Files for Chapter 11," *Law360*, March 16, 2006, available at <http://www.law360.com/articles/5730/u-s-unit-of-lg-philips-files-for-chapter-11>, accessed November 1, 2014. Production share data obtained from the back-up to Exhibit 6 of the Netz Damages Report (which contains data only for the 2000-2006 period).

⁵⁴ Netz Damages Report, p. 69. In earlier filings, Dr. Netz defined a "price structure" such that it implies that the relative prices across CRTs would be approximately the same in the actual and but-for worlds at a given point in time. See, e.g., Declaration of Janet S. Netz, Ph.D., in Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, February 15, 2013, p. 39. ("The relative prices that are reflected in the price structure are substantially the same in the actual world as in the but-for world. Relative prices are ratios of prices at a point in time; if both prices change by the same percentage, the relative price is unchanged.")

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that such variation in relative prices is inconsistent with the price structure claimed by Dr. Netz.⁵⁵

43. In response, Dr. Netz contends that variation in relative prices of CPTs over time is consistent with the existence of a “price structure.”⁵⁶ She is incorrect. If there were substantial heterogeneity in price movements across CPTs (*i.e.*, relative prices across CPTs changed materially over time), then it is highly likely that different CPTs were affected by different market forces or were affected by the same market forces differently. Under these conditions, the existence of a price structure of the sort claimed by Dr. Netz is highly unlikely because even if market conditions prevalent in one segment of CPTs permitted the alleged cartel to effectively elevate prices of CPTs in that segment, it does not necessarily follow that the putative cartel would also have been effective in elevating prices of CPTs in other segments where different market conditions prevailed.⁵⁷ In other words, even if the alleged cartel impacted the prices of certain CPTs,

⁵⁵ Willig Damages Report, ¶ 56.

⁵⁶ Netz Rebuttal Report, p. 31. See also Netz Rebuttal Damages Deposition, p. 57 (Question: “Okay. So under your concept of a price structure, as you articulated it, it allows for the fact that within that price structure, as you see it, different size CRTs could be moving in opposite price directions?” Answer: “Well, it depends on what is going on in the particular situation. A price structure is determined by a variety of supply and demand forces, and if between the two periods some of those are changing, then you could -- there could still be a price structure despite movements over time that are not in the same direction.”)

⁵⁷ A price structure of the sort claimed by Dr. Netz is highly unlikely in part because CPTs were widely differentiated by features such as size, shape, resolution, the inclusion or exclusion of deflection yokes, type of mask, electrical properties, and the extent and type of customization. In her rebuttal report, Dr. Netz contends that I have exaggerated the extent of CPT price differentiation because I have analyzed the extent of CPT price dispersion across CPT model-customer combinations, whereas (according to Dr. Netz) the relevant level product aggregation is a CRT “product family” (which is a relatively higher level of aggregation grouping together CPT models based on a variety of characteristics). According to Dr. Netz, there is relatively little price dispersion within a product family, and a few families account for the bulk of sales by a manufacturer. (Netz Damages Rebuttal Report, pp. 24-6.) However, it is not surprising that prices exhibited less variation for sales of a particular type of CPT than across all CPT sales. However, since the Plaintiffs comprise a class of indirect purchasers of CPT finished products that were manufactured using vastly different types of CPTs and since Dr. Netz contends that

(footnote continued ...)

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it does not inevitably follow that the prices of other CPTs were also impacted if market conditions differed among them.⁵⁸

44. The record evidence on CPT prices makes it clear that although CPT prices mostly declined during the relevant period, there was substantial heterogeneity in CPT price movements, which is evidence of differentiated market forces in effect in various categories of CPTs. For example, Exhibit 4 illustrates the price paths of two popular CPT models sold by SDI during the relevant period: one model was a 29-inch flat ITC CPT and the other a 21-inch curved ITC CPT.⁵⁹ As is evident from Exhibit 4, the price of the

(... footnote continued)

there is a “price structure” that links all these products, it is relevant to understand the substantial heterogeneity in prices at any given time across all CPTs included in the products purchased by the proposed class, not just the heterogeneity across all CPTs of a particular type.

⁵⁸ Dr. Netz acknowledges that in a hypothetical situation in which differentiated market forces impacted the prices of different CRTs, the fact that the alleged cartel impacted prices of smaller CRTs does not necessarily imply that the prices of larger CRTs were also impacted.

Question: Okay. And it's possible, is it not, that a market force like that, LCDs which had differential effects on different size CRTs, could cause a situation where a particular size of CRT is moving in one direction while a different CRT is moving in a different direction because the market forces it is facing are not the same, right?

Answer: Assuming when you said the CRTs are moving, you meant their prices, yes, that's possible. (Netz Rebuttal Damages Deposition, pp.57-58.)

Question: I'll use your words. Have you found that the prices of CRTs at a point in time are sufficiently related to each other that those relationships would necessarily mean that if there was only price-fixing for CPTs below 21 inches, 21 inches or below, that there would be a price effect on a CRT that was 36 inches?

Answer: With the information in the hypothetical, there may or may not be an effect of 36 inches, and I would have to look at the underlying data to determine the answer to that question. (Netz Rebuttal Damages Deposition, p. 62.)

⁵⁹ The model numbers are A21GT00389 (29 inches) and A29CT00183 (21 inches). These two models were the two in the relevant categories (29-inch flat ITC CPTs and 21-inch curved ITC CPTs sold by SDI) that were in the top 15 in terms of sales volumes and had the greatest overlap in terms of numbers of quarters in which both were sold.

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29-inch CPT declined substantially more than the price of the 21-inch CPT between Q4 2001 and Q4 2004 (the longest continuous period of overlapping sales of the two models), so that by the end of this 3-year period, the price premium commanded by the 29-inch model was 31% lower than at the beginning of the period. The divergent price movements evident in this specific pair of CPTs are illustrative of divergent price changes more generally. As explained in my initial damages report, annualized versions of Dr. Netz's sales-price hedonic regressions (which utilize data on all models sold by all manufacturers in the record) show that, in 2000, 29-inch CPTs were priced 144% above 21-inch CPTs on average (i.e., the prices for 29-inch CPTs were nearly 2.5 times the prices of 21-inch CPTs), but by 2005 this premium had decreased to 106%.⁶⁰

45. The presence of differentiated market forces is further evidenced by the wide variation in quarter-to-quarter price changes of different CPT models, which is illustrated in Exhibit 5-A. The exhibit shows the wide dispersion in quarter-to-quarter CPT price changes. In most quarters during the class period, the quarter-to-quarter changes of CPT prices ranged from increases of more than 5% to decreases of more than 10%, and prices frequently moved in opposite directions.^{61, 62}

⁶⁰ Willig Damages Report, ¶ 56.

⁶¹ In Exhibit 5-A, the average price for each CPT model, customer, factory and quarter is presented as a single data point, regardless of the associated sales volume. However, weighting prices by sales volume does not alter my conclusion that changes in CPT prices in any given quarter exhibited substantial heterogeneity. For example, on average, the 90th percentile of the sales-volume-weighted distribution of CPT price changes in a given quarter was 3.9 percentage points higher than the weighted average CPT price change for that quarter, and the 10th percentile of the distribution was 4.3 percentage points below the average price change. Put differently, on average, the 90th percentile of the sales-volume-weighted distribution of CPT percent price changes in a given quarter was roughly 8.2 percentage points above the 10th percentile percent price change.

⁶² Dr. Netz has previously raised the possibility that the observed variation in changes in prices expressed in U.S. dollars includes some situations in which prices expressed in the currency in which they were negotiated (the "negotiated currency") did not change but the price expressed in U.S. dollars changed due to exchange rate movements. (Rebuttal Declaration of Janet S. Netz, Ph.D., In Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, February 15, 2013, pp. 17-18, 38.) However, in an average quarter, 71% of negotiated currency prices for

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46. Exhibit 6-A provides further evidence of differentiated market forces in the CPT marketplace and the heterogeneous price movements caused by such differentiated market forces. The exhibit shows that the price of one CPT model relative to another frequently changed by at least 5% over the span of just one quarter.⁶³ For example, in a typical quarter, the relative price between 29% of the pairs of CPTs changed by at least 5%.^{64, 65} Moreover, the relative prices of these 29% of CPT pairs changed by more than 9% on average. Similarly, the relative prices between large and small CPTs frequently changed by at least 5% from one quarter to the next. Specifically, in a typical quarter, the relative prices between 31% of pairs of large and small CPTs changed by at least 5% (See

(... footnote continued)

CPTs were adjusted by at least 1% (using CPT sales quantities as weights), which implies that the scenario posited by Dr. Netz does not apply to the majority of instances noted in Exhibit 5-A. Moreover, Exhibit 5-B shows that removing data points where there is little or no change in prices expressed in the negotiated currency does not alter results qualitatively. That is, there was a wide dispersion in quarter-to-quarter CPT price changes (expressed in dollars) for the 71% of sales in which the negotiated currency price was adjusted by at least 1% between the relevant quarters. Specifically, for such sales, as shown in Exhibit 5-B, on average, the 90th percentile of the sales-volume-weighted distribution of CPT percent price changes in a given quarter was 4.4 percentage points higher than the weighted average CPT percent price change for that quarter, and the 10th percentile of the distribution was 4.6 percentage points below the average percent price change. Put differently, on average, the 90th percentile of the sales-volume-weighted distribution of CPT percent price changes in a given quarter was roughly 9.0 percentage points above the 10th percentile percent price change.

⁶³ As noted in my initial damages report and above, the record indicates that relative price differentials as small as 5% are material in this marketplace. (Willig Damages Report, ¶. 51. (See, e.g., “Market Visitation Report (Submitted),” Chunghwa Picture Tubes, October 17, 2002, CHU00030410E-413E at 412.01E; “CPT Meeting Result Report (Dec.),” SDI, December 28, 2004, SDCRT-0090210-14_trans at p. 3; and “CPT Sales Division Customer Contact Report,” Chunghwa Picture Tubes, October 4, 1999, CHU00028599E-600E at CHU00028600E.))

⁶⁴ The methodology behind this analysis is described in the notes to Exhibit 6-A.

⁶⁵ As noted in *supra* note 62, Dr. Netz has previously raised the possibility that the observed variation in changes in prices expressed in U.S. dollars includes some situations in which prices expressed in the negotiated currency did not change but the price expressed in U.S. dollars changed due to exchange rate movements. However, even when the analysis is confined to sales for prices expressed in the negotiated currency changed by at least 1%, the results displayed in Exhibit 6-A do not change qualitatively. In fact, in such situations, it was even more common for the relative price of a pair of CPTs to change by at least 5%. (See Exhibit 6-B.)

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Exhibit 6-A.) The relative prices of these 31% of CPT pairs changed by more than 9% on average.

47. As further support for her claimed price structure, Dr. Netz presents what she refers to as a “hedonic pricing analysis.”⁶⁶ However, as I explained in my initial damages report, Dr. Netz’s claim of a price structure is refuted by her own data and analyses.⁶⁷ In her rebuttal report, Dr. Netz makes a few minor modifications to her hedonic regression analysis and contends that the existence of a CPT price structure is supported by this analysis because it shows that “CRT prices are determined almost entirely by a handful of product characteristics including the date of sale.”⁶⁸ However, I find that a material amount of CPT price variation is left unexplained by the common factors that are identified by Dr. Netz.

48. As discussed in my initial damages report, several “target price” documents cited by Dr. Netz indicate that Defendants considered price differentials between manufacturers of 5% or less to be enough to shift sales and shares.⁶⁹ This implies that price differences of

⁶⁶ Netz Damages Report, pp. 68-69; Netz Damages Rebuttal Report, pp. 31-2.

⁶⁷ Willig Damages Report, § V.D. For example, the hedonic regressions estimated by Dr. Netz in her initial damages report show considerable variation over time in the relative price premiums commanded by larger CPTs over smaller CPTs, which is strong evidence that market conditions differed materially between large and small CPTs. Differences in the price premiums commanded by 29-inch CPTs over 21-inch CPTs in adjacent years were typically statistically significant at the 5% level.

⁶⁸ Netz Damages Rebuttal Report, p. 32. In her rebuttal report, Dr. Netz proposes an extension to her hedonic regression analysis wherein she “annualizes” her model by interacting her control variables (e.g., CPT characteristics) with year dummies. She concludes that this annualized version of her model fits the data better (i.e., has a higher R-squared statistic) than the hedonic model used in her initial damages report which did not have such interactions. (*Id.*, fn. 139.) The “annualized” version of Dr. Netz’s model permits the estimates of various product characteristics’ impacts on CPT prices to vary over time. The fact that these estimates do in fact vary over time is further evidence against her claimed “price structure” for reasons explained in my initial damages report (Willig Damages Report, ¶ 56). In the remainder of this section, where I discuss whether Dr. Netz’s hedonic model can adequately explain CPT price variation, I focus on her “annualized” model.

⁶⁹ Willig Damages Report, ¶ 51. (See, e.g., “Market Visitation Report (Submitted),” Chunghwa Picture Tubes, October 17, 2002, CHU00030410E-413E at 412.01E; “CPT Meeting Result

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even 5% are material in this industry. Thus, if it were true that Dr. Netz's sales price hedonic regressions leave no material price variation unexplained, then the gap between the price predicted by these regressions and the actual price should rarely exceed 5%. In fact, I find the opposite: very rarely are prices predicted by Dr. Netz's hedonic regressions within 5% of the actual prices charged for specific CPTs. Specifically, the (absolute) differences between observed CPT prices and the prices predicted by Dr. Netz's hedonic regressions exceed 5% for 60.5% of the observations.⁷⁰ I conclude that a material amount of CPT price variation arises from factors not included in Dr. Netz's sales price hedonic regressions. This fact, together with the considerable variation over time in the relative price premiums commanded by larger CPTs over smaller CPTs (as explained in my initial damages report),⁷¹ is strong evidence against the "price structure" claimed by Dr. Netz.

49. In sum, the observed heterogeneity of changes in CPT prices indicates that there were substantially heterogeneous market forces impacting the prices of various CPTs during the Class Period, and the presence of such market heterogeneity is inconsistent with the "price structure" claimed by Dr. Netz. Moreover, Dr. Netz's hedonic regression analysis does not support her claimed "price structure."

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Report (Dec.)," SDI, December 28, 2004, SDCRT-0090210-14_trans at p. 3; and "CPT Sales Division Customer Contact Report," Chunghwa Picture Tubes, October 4, 1999, CHU00028599E-600E at CHU00028600E.)

⁷⁰ The estimated error rate of 60.5% is based on estimating the annualized version of Dr. Netz's hedonic regression model presented in her rebuttal report. (In this regression, the independent variables are: time trend, squared time trend, characteristic dummies for CPT size, aspect ratio and finish, year dummies, interactions of year dummies and characteristic dummies, and buyer-seller dummies.) I have also extended Dr. Netz's annualized hedonic regression model to include control variables for exchange rates and to weight observations by the sales quantities associated with them. Even with these extensions, the (absolute) difference between actual observed CPT prices and prices predicted by Dr. Netz's hedonic regressions exceed 5% for almost half 48.4% of the observations.

⁷¹ Willig Damages Report, ¶ 56. (In this regression, the independent variables are: time trend, squared time trend, characteristic dummies for CPT size, aspect ratio and finish, buyer-seller dummies, and exchange rates. Regressions were weighted by quantity.)

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VI. Defendants' Conduct in the CPT Marketplace Was Inconsistent with a Sustained and Effective Cartel that Had a Class-wide Impact.

50. In my initial damages report, I noted that even by her own calculations, Dr. Netz identified target prices that corresponded to a minority (29.7%) of worldwide CPT sales during the class period. Using the same methodology reveals that Dr. Netz identified target prices corresponding to an even lower share of North American (17.0%) and large CPT sales (13.7%).⁷² In that report, I made several corrections to the methodology that Dr. Netz used to match CPT sales with the claimed CPT target prices, and concluded that, during the class period, at most 17.4% of CPTs sold worldwide, 9.9% of CPTs sold in North America, and 5.0% of large CPTs were associated with an alleged target price.⁷³ Although Dr. Netz has criticized these figures, I stand by those corrections.^{74, 75}

⁷² Deposition of Robert D. Willig, September 19, 2014, pp. 9-10. The “coverage” for North American CPT sales is relevant because a large share of the CRT TVs purchased by the indirect purchaser class members were manufactured in North America using CPTs sold in North America. The coverage of large CPT sales is relevant because they represent a disproportionate share of the damages – Dr. Netz’s overcharge estimates are much higher for larger CPTs and U.S. consumers purchased a higher share of large CPT TVs than non-U.S. consumers during the class period. (iSuppli Television Systems Market Tracker Database) Additionally, as discussed in my initial damages report (Willig Damages Report, ¶¶ 34), the fact that the coverage for large CPTs was so much lower than for small CPTs is consistent with the evidence that competition from LCD and plasma technologies likely reduced the alleged cartel members’ ability and incentive to elevate prices for large CPTs to an even greater extent than for small CPTs.

⁷³ Willig Damages Report, ¶¶ 33, 34, and 96. For the same reasons I laid out in my first report (Willig Damages Report, ¶ 33), the corrected coverage estimates surely overstate the share of actual sales that corresponded to the target prices identified by Dr. Netz because they assume that there was a target price applicable to a CPT if they shared the same manufacturer, size, finish, and in some cases shape, even if they did not share other attributes, such as the type of mask.

⁷⁴ Dr. Netz’s primary criticism is that I “assumed that a target price is only effective during the month in which it was to take effect,” thereby artificially limiting the extent of target price coverage. (Netz Damages Rebuttal Report, p. 10.) This description mischaracterizes my methodology. I did not make a determination of which months each target price was in effect. Rather, I accepted the methodology that Dr. Netz has used since the class certification phase to determine the months in which a target price was effective. (See, e.g., Netz Class Certification Report, fn. 192; Netz Class Certification Rebuttal Report, p. 42 and fn. 154; and “CleanTarget.do” from the backup to the Netz Class Certification Rebuttal Report and the Netz Damages Report.) For a majority of the CPT target prices that she identified, her methodology –

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However, regardless of precisely how the coverage is calculated, there is no dispute that Dr. Netz identified target prices that corresponded to a minority of worldwide CPT sales during the class period, and that they corresponded to a much smaller share of North American and large CPT sales.

51. I previously demonstrated that cheating on the alleged target prices was pervasive. Specifically, I showed that, “60.4% of the CPTs sold worldwide for which Dr. Netz identified an alleged applicable target price were priced below that target price.”⁷⁶ Dr. Netz claims that this fact is irrelevant:

“The fact that some actual prices were below target prices does not mean that Defendants set prices at the competitive level. It only indicates that Defendants did not raise prices as high as they wanted. ... The proper way to evaluate the effectiveness of the cartel is to compare actual prices with what the prices would have been if Defendants had competed instead of colluding to raise prices. Accordingly, a simple comparison of target and

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which I adopted – assumes that the target price was effective for more than one month, i.e., it does not assume “that a target price is only effective during the month in which it was to take effect.”

⁷⁵ Dr. Netz also takes issue with my criticism and reversal of her decision to include in her target price coverage calculation CPT sales by manufacturers that did not attend a meeting in which a particular target price was set as long as those CPTs shared certain attributes with the target price. Dr. Netz claims that her decision was appropriate because “there is substantial evidence that decisions made at cartel meetings were communicated to CRT manufacturers that did not attend those meetings.” (Netz Damages Rebuttal Report, p. 12.) However, the documents and testimony that Dr. Netz cites do not indicate that all (or most) of the alleged co-conspirators were contacted about all (or most) of the target prices, much less that any of the non-attendees agreed to those target prices. If Dr. Netz was intending to calculate the share of sales that she believes *may* have been targeted, she might as well have reported a coverage of 100%. Such a coverage calculation would be of little probative value, however. If, instead, Dr. Netz’s intent was to calculate the share of CPT sales for which target prices were agreed to in the meeting minutes she identified, it makes no sense to include sales by entities who did not attend the pertinent meeting and for which Dr. Netz has provided no direct evidence that they were aware of or agreed to the alleged target prices.

⁷⁶ Willig Damages Report, ¶ 35.

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actual prices is irrelevant to the question of how successful cartel members were at raising prices.”⁷⁷

52. I agree with Dr. Netz that the fact that a particular CPT was priced below the relevant target price by itself does not necessarily indicate that the CPT was priced at the competitive level. However, this does not imply that evidence of pervasive cheating is “irrelevant.” The existence of pervasive cheating strongly suggests that the alleged cartel was not stable, which likely limited its effectiveness in elevating prices above but-for price levels.⁷⁸ Moreover, the cheating exhibited by the alleged cartel members was not only pervasive, it was also of substantial magnitude. Specifically, 36.5% of CPTs sold worldwide for which Dr. Netz identified an alleged applicable target price were priced at least 5% below that target price.⁷⁹ As I discussed in previous reports, documents cited by

⁷⁷ Netz Damages Rebuttal Report, p. 42.

⁷⁸ Dr. Netz cites two academic articles written for the proposition that cartels can exist in the presence of cheating. (Netz Damages Rebuttal Report, pp. 38-40) However, these articles do not suggest that the presence of cheating is irrelevant to whether the cartel was successful – on the contrary, they indicate that cheating can lead to cartel collapse. (Levenstein, Margaret C. and Valerie Y. Suslow, 2006, What Determines Cartel Success?, *Journal of Economic Literature*, Vol. XLIV, 43-95, (“Levenstein and Suslow (2006)”), pp. 75-76; Levenstein, Margaret C. and Valerie Suslow, May 2011, Breaking up is Hard to Do: Determinants of Cartel Duration, *Journal of Law and Economics*, 54(2), 455 - 492, p. 468.) Moreover, the articles make clear that the fact that a cartel persisted does not imply that it was effective at substantially elevating prices:

“Cartel duration is the most common measure of cartel success because it is the most easily measured, but it is clearly unsatisfactory in capturing the economic impact of cartels. There are cases where cartels have continued to exist on paper for many years with little sustained effect on price.” (Levenstein and Suslow (2006), p. 45.)

⁷⁹ I have performed two robustness checks for this analysis. First, I matched CPT sales and the CPT target prices identified by Dr. Netz by manufacturer, size, finish, quarter, *and shape* for the CPT sales observations for which data are available on the CPT’s shape (Dr. Netz matched CPT actual and target prices by manufacturer, size, finish, and quarter) and found that 55.4% of the CPT sales quantity for these observations was priced below the alleged target price, and 30.2% was priced at least 5% below the alleged target price. Second, Dr. Netz in some cases averaged multiple target prices together to obtain a single CPT target price observation for a given manufacturer, size, finish, and quarter. As a robustness check, I compared actual CPT prices to the lowest CPT target price she identified for each manufacturer, size, finish, and quarter. Because this approach compares premium and basic CPT prices with target prices that are more

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Dr. Netz indicate that price differences of even 5% can result in shifts in sales and shares.⁸⁰ As a result, the high frequency with which CPT prices were at least 5% below the alleged target price is a strong indicator that the alleged cartel was not stable.

53. I also previously demonstrated that changes in target prices were poor predictors of changes in actual prices.⁸¹ In particular, I demonstrated that changes in the alleged CPT target prices identified by Dr. Netz explain only 3.9% of the variation in changes in the actual prices of corresponding CPTs.⁸² Dr. Netz ignores this finding and focuses instead on my finding that a 5% increase in the target price identified by Dr. Netz is, on average, associated with only a 1.06% increase in the actual prices for corresponding CPTs during the same quarter. Dr. Netz claims that this result “prove[s] exactly the opposite of what [I] claim.”⁸³ Dr. Netz’s assertion is incorrect on several levels.

- By equating a very modest correlation between actual and target prices with the “opposite” of what I claim, Dr. Netz implies that I claimed that the target prices had zero effect on actual prices, which is a claim I did not make. I claimed only that the target prices appeared to have at most a

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likely to be for basic CPTs, it is biased towards finding actual prices that are higher relative to target prices. Nevertheless, I still find that 51.3% of the CPTs sold worldwide for which Dr. Netz identified an alleged applicable target price were priced below the minimum potentially applicable target price, and 28.9% of CPTs sold worldwide for which Dr. Netz identified an alleged applicable target price were priced at least 5% below that target price. Thus, all three approaches to comparing actual and target CPT prices produce a similar picture of pervasive and material cheating on the alleged target prices by the alleged cartel members.

⁸⁰ Willig Damages Report, ¶ 51. (See, e.g., “Market Visitation Report (Submitted),” Chunghwa Picture Tubes, October 17, 2002, CHU00030410E-413E at 412.01E; “CPT Meeting Result Report (Dec.),” SDI, December 28, 2004, SDCRT-0090210-14_trans at p. 3; and “CPT Sales Division Customer Contact Report,” Chunghwa Picture Tubes, October 4, 1999, CHU00028599E-600E at CHU00028600E.)

⁸¹ Willig Damages Report, ¶¶ 42-48 and Exhibit 8.

⁸² *Id.*, ¶ 42 and Exhibit 8.

⁸³ Netz Damages Rebuttal Report, pp. 43.

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limited effect, which is consistent with the modest correlation Dr. Netz cites and inconsistent with her claim of a highly effective cartel.

- As Dr. Netz acknowledges, this modest correlation is further diminished when one controls for market conditions. Specifically, I demonstrated that adding in the controls for market conditions that she used in her target price and overcharge regressions reduces the estimated association between actual and target prices almost in half (i.e., a 5% increase in the CPT target price identified by Dr. Netz is, on average, associated with only a 0.57% increase in the actual prices for corresponding CPTs).⁸⁴
- Even this modest correlation likely overstates any impact that target prices had on actual prices due to the presence of uncontrolled for changes in market forces that affected both actual and target prices. As discussed in greater detail in Section XIII.A of my initial damages report and also later in this section, the market variables that Dr. Netz includes, which I also used for my analysis, are insufficient to control for the dramatic changes that transpired in the industry over the course of the class period.
- As discussed in my initial report, there is evidence in the documents cited by Dr. Netz of the alleged target prices being set at least partly based on past actual prices,⁸⁵ which would also cause my analysis of actual and target price changes to overstate the impact that target prices had on actual prices.

⁸⁴ Willig Damages Report, ¶ 43. In Exhibit 6, Row 2, I present the results from adding exchange rates for the relevant currencies to these macroeconomic controls (i.e., I combine the regressors for Rows 2 and 3 of Exhibit 8 of my initial damages report). This regression implies that a 5% increase in the CPT target price identified by Dr. Netz is, on average, associated with only a 0.53% increase in the actual prices for corresponding CPTs.

⁸⁵ Willig Damages Report, ¶ 50. (See, e.g., “Visitation Report (Submit),” Chunghwa Picture Tubes, May 25, 2000, CHU00029131E–137E at CHU00029136.01E; “CPT Sales Division Customer Contact Report,” Chunghwa Picture Tubes, October 4, 1999, CHU00028599E–600E at CHU00028600E; and “Visitation Report (Submitted),” Chunghwa Picture Tubes, December 21, 2001, CHU00036390E–391E at CHU00036391E.)

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54. Dr. Netz also takes issue with my decision to analyze changes in actual and target prices. In particular, she claims that performing a regression analysis of actual and target price *changes* (as I did) rather than on actual and target price *levels* (as she did) “biases the regression results towards finding no relationship between actual and target prices.”⁸⁶ In particular, she claims that analyses of actual and target price changes are more sensitive than analyses of target price levels to the presence of noise in the actual and target price data.⁸⁷

55. As an initial matter, although Dr. Netz posits some potential causes of noise in the actual and target prices data, she makes no attempt to measure the extent of such noise and thus provides no indication that data noise is a significant concern for this analysis.⁸⁸

⁸⁶ Netz Damages Rebuttal Report, pp. 44-45.

⁸⁷ Dr. Netz attempts to support her claim that analyses of actual and target price *changes* are more sensitive than analyses of target price *levels* to the presence of noise in the actual and target price data through a data simulation that she concedes is purely hypothetical (“Nor do I claim that the simulated data represent the Defendant data”). (Netz Damages Rebuttal Report, p. 46) Dr. Netz provides no evidence that the data noise she assumed was representative of the data in this case or that data noise had a significant influence on my analysis. Additionally, her simulation illustrates how an analysis of actual and target price levels could lead one to mistakenly conclude that the alleged cartel members adhered closely to the target prices if both were influenced by the same market forces.

⁸⁸ One potential cause of data noise that Dr. Netz posits is: “Given the incomplete information [on CRT characteristics], several CRTs may be used to calculate a single average price, and that price may fluctuate due to changes in the mix of CRTs over time. This can affect actual prices and target prices.” (Netz Damages Rebuttal Report, fn. 200.) I calculated actual CPT price changes by CPT model (and factory and customer), and therefore my calculation would be completely unaffected by changes in the mix of CPTs over time (which is precisely why I did so). Dr. Netz is correct that she chose to average together all CPT target prices for a particular manufacturer, size, and finish (“group”), and quarter, and I accepted the choices she made in constructing this dataset in order to avoid a debate about the data. As a result, I calculated target price changes by CPT group. However, changes in the mix of the targeted CPTs could introduce significant data noise into my calculation of CPT target price changes only if (i) there were substantial changes in mix for a particular group of CPTs sold in the span of less than a year (the maximum time gap considered in my analysis of actual and target price changes), and (ii) the changes in mix related to characteristics that had a material impact on CPT prices. Dr. Netz has provided no evidence that the first condition holds. As for the second condition, Dr. Netz has stated repeatedly that she believes that size, shape, and finish are the only major CPT price

(footnote continued ...)

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Dr. Netz neglects to mention that she applied a price filter to eliminate outlier prices from the data and that I used her filter in my analysis. Dr. Netz provides no indication that she believes that this outlier filter, which is the filter she uses for all of her pricing analyses, is insufficient. She also neglects to mention that I implemented an additional outlier filter that focused on precisely the type of unusual patterns in prices over time that could introduce noise into an analysis of price changes. Needless to say, Dr. Netz provides no indication, much less any analysis, to suggest that any data noise remaining after both outlier filters have been implemented creates a significant bias in my analysis of actual and target price changes.

56. Just as Dr. Netz provides no empirical analysis to establish that my approach materially under-estimates the relationship between actual and target prices due to data noise, she provides no empirical analysis to refute my conclusion that her approach materially over-estimates that relationship. As I explained in my initial damages report, because the same market forces that influenced actual CPT prices surely also influenced target CPT prices, one would expect actual and target CPT prices to have a similar long-term trend regardless of whether the target prices had any influence on the actual prices.⁸⁹ For example, one would expect declining CPT production costs to cause both actual and target CPT prices to decline. Even if the alleged cartel members frequently deviated from the alleged CPT target prices by a sufficient amount to shift a substantial share of

(... footnote continued)

determinants, and she has characterized all other characteristics as minor. (See, e.g., Netz Damages Rebuttal Report, fn. 104 and Netz Class Certification Rebuttal Report, pp. 12-13.) If she is correct, then as long as I calculate changes for target prices specified for the same manufacturer, size, finish, and shape, then any changes in the mix of other characteristics would have at most a minimal effect on the calculated price changes. Thus, to address the potential concern that Dr. Netz has raised, I have gone back and re-averaged her CPT target prices by manufacturer, size, finish, and shape and matched these target prices with the actual prices for CPTs with the same manufacturer, size, finish, and shape for the observations for which it was possible to do so. I then re-estimated my regressions of actual and target price changes and found that measuring CPT target price changes by manufacturer, size, finish, and shape rather than manufacturer, size, and finish has a minimal effect on the results. (See Exhibit 7.) The relationship between changes in actual and target prices continues to be extremely weak.

⁸⁹ Willig Damages Report, ¶ 50.

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CPT sales, and these deviations limited the alleged target CPT prices' impact on actual CPT prices, the deviations likely still would have been modest compared to the cumulative impact that market forces had on actual and target CPT prices over the course of many years. If the conditions described above – material changes in CPT market conditions coupled with frequent material deviations from the alleged target prices – prevailed during the class period, an emphasis on the similar long-term trends in CPT actual and target price *levels* would mistakenly lead one to conclude that the alleged cartel members had adhered rigorously to the target prices, whereas an analysis of actual and target price *changes* would correctly reveal that the alleged cartel members had not adhered closely to the alleged target prices.

57. Thus, in the presence of significant market forces affecting actual and target CPT prices, a regression of actual and target price *levels* could bias the analysis towards finding adherence, whereas a regression of actual and target price *changes* would not (or would at least do so to a lesser extent). Dr. Netz suggests that this bias does not apply to her analysis because she controlled for “changing supply and demand conditions including macroeconomic factors and the cost of glass”⁹⁰ However, although Dr. Netz does include some macroeconomic variables in her regression of actual and target price levels, the inclusion of these variables fails to control for a material share of the impact that market conditions – which changed fundamentally over the course of the class period – had on actual and target CPT prices.⁹¹

58. One way to see this is via what is known as the “within R-squared” statistic of her regression of actual and target CPT price levels, which in this case measures the share of

⁹⁰ Netz Damages Rebuttal Report, p. 45.

⁹¹ Dr. Netz also claims that she controlled for CPT product differences by including fixed effects in her regression. (Netz Damages Rebuttal Report, pp. 44-45 and fn. 194.) However, as the name suggests, Dr. Netz's use of fixed effects assumes that the relative influence of various product characteristics on prices was invariant over time (See, e.g., Greene, William S., 1997, *Econometric Analysis* 3rd edn, Prentice Hall, Upper Saddle River, N.J. p. 615), which, as I noted in my initial report, is entirely inconsistent with the implications of her hedonic regression analysis when run separately by year. (Willig Damages Report, ¶ 56.)

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variation in prices over time for a particular manufacturer, customer, size, and finish that is explained by the variables in her regression.⁹² If the macroeconomic variables and the previous period's actual price that Dr. Netz included in her regression control for all of the changes in market forces that affected CPTs, the within R-squared for her regression should be close to 1. Instead, the within R-squared for her CPT actual-target price regression is 0.675, which implies that 32.5% of the intertemporal price variation for a given manufacturer, customer, size, finish, and factory is not explained by the variables in her regression. This in turn indicates that Dr. Netz's model fails to control for a material share of the influence of changing market forces over time.^{93, 94}

59. Further evidence that Dr. Netz failed to control for a material share of the influence of market forces on actual CPT prices is obtained by adding the following quarter's target price (i.e., the future target price) as a variable in her CPT actual-target price regressions (which are described in the Netz Damages Report, Exhibits 38 and 45). When this variable is added to those regressions, the estimated coefficient is positive and statistically significant. (See Exhibit 8.) Because the next quarter's target price cannot be

⁹² See, e.g., StataCorp. 2013. Stata Longitudinal-Data/Panel-Data Reference Manual. College Station, TX: Stata Press., p. 368 (available at <http://www.stata.com/manuals13/xt.pdf>).

⁹³ These results are based on the regression presented in Exhibit 38 of the Netz Damages Report. The within R-squared of her regression of actual CPT prices on the target CPT price index Dr. Netz constructed is 0.555, which implies that her regressors do not explain 44.5% of the intertemporal actual CPT price variation. These results are based on the regression presented in Exhibit 45 of the Netz Damages Report.

⁹⁴ Moreover, the within R-squared for Dr. Netz's regression almost surely overstates the extent to which she controlled for the influence of changes in market forces on actual CPT prices, because any market forces not otherwise controlled for still would have influenced CPT target prices. Since the whole purpose of controlling for changes in market forces is to prevent the target prices from receiving undue credit for influencing actual prices, it makes sense to exclude the target price when assessing whether Dr. Netz has fully controlled for market forces. When I re-estimate Dr. Netz's CPT actual-target price regression with all of the regressors except the target price, I find that her regressors fail to explain 34.7% of the intertemporal CPT price variation. When I re-run Dr. Netz's regression of actual CPT prices on the target CPT price index with all of the regressors except the target price index, I find that her regressors fail to explain 44.8% of the intertemporal CPT price variation.

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causing the actual price in the current quarter, this result suggests two (not mutually exclusive) possibilities.

60. The first possibility is that some of the observed correlation in actual and target prices is the result of target prices responding to actual prices rather than the other way around; e.g., if target prices were lowered as a result of cheating on the previous target price. As I noted in my initial damages report and above, there is evidence in the documents cited by Dr. Netz of the alleged target prices being set at least partly based on past actual prices.⁹⁵ If target CPT prices were set even partly based on actual CPT prices, both Dr. Netz's analysis of actual and target CPT price levels and my analysis of actual and target CPT price changes would overstate the influence of target prices on actual prices.

61. The second possibility is that actual prices during a given time period often responded to changes in market forces that also influenced future target prices and which were not fully controlled for by Dr. Netz's regressors. This is particularly evident from the fact that adding the future target price to Dr. Netz's actual-target price regression causes the estimated coefficient on the current period's target price (0.148) to be substantially lower than what Dr. Netz reported (0.342),⁹⁶ and adding the future target price index to her actual-price-target-price-index regression causes the estimated coefficient on the current period's target price index to be effectively zero.⁹⁷ (See Exhibit 8.) This demonstrates

⁹⁵ Willig Damages Report, ¶ 50. (See, e.g., "Visitation Report (Submit)," Chunghwa Picture Tubes, May 25, 2000, CHU00029131E-137E at CHU00029136.01E; "CPT Sales Division Customer Contact Report," Chunghwa Picture Tubes, October 4, 1999, CHU00028599E-600E at CHU00028600E; and "Visitation Report (Submitted)," Chunghwa Picture Tubes, December 21, 2001, CHU00036390E-391E at CHU00036391E.)

⁹⁶ Even these estimates likely overstate the influence of target prices on actual prices because of the possibility that the causation sometimes ran in the opposite direction (i.e., target prices responded to actual prices), and because there is no reason to believe that adding the future target price to the model implies that all changes in market forces have been fully controlled for.

⁹⁷ Adding the future target price to Dr. Netz's CPT actual-target price regressions reduces the number of observations because Dr. Netz did not always find a CPT target price for the same manufacturer, size, finish, customer, and factory in the following quarter. However, the sample size still exceeds 3,000 for the regression of actual prices on target prices and 8,000 for the regression of actual prices on the target price index. Moreover, when Dr. Netz's regressions are

(footnote continued ...)

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that the observed long term correlation between CPT actual prices and CPT target prices that Dr. Netz presents is largely driven by market forces for which her regressors fail to control. It is this failure to control for market forces that causes her regression of actual and target CPT price levels to mistakenly interpret the long-term correlation between actual and target CPT prices as adherence by the alleged cartel members to those target prices.

62. Even if one were to accept Dr. Netz's claim that a regression analysis of actual and target prices is more appropriately conducted based on actual and target price *levels* rather than price *changes*, I previously demonstrated that target CPT price levels were poor predictors of actual CPT price levels. Specifically, I showed that "predicting the average actual price for a given CPT based on the alleged applicable target price could be expected to be wrong by more than 5% at least 86% of the time, by more than 10% at least 72% of the time, and by more than 15% at least 56% of the time."⁹⁸ If the alleged cartel members had adhered closely or consistently to the alleged CPT target prices, one would not expect the target prices to be such poor predictors of actual CPT prices. Dr. Netz criticizes me for trying to predict actual prices based on target prices alone:

When Defendants set their actual prices, they had full knowledge of prior prices and supply and demand conditions in addition to the target prices. They would not have had complete information about future supply and demand conditions when they set the target price. Since the underlying information on which Defendants based prices was different for targets

(... footnote continued)

limited to this sample (i.e., when the sample is limited to observations with a future target price (or index), but no future target price (or index) is added to her regression), the estimated coefficients on the current period target price (or index) are nearly the same as those reported in Exhibits 38 and 45 of her damages report (0.374 as compared to the 0.342 that she reported in Exhibit 38, and 0.177 as compared to the 0.196 that she reported in Exhibit 45). Thus, the fact that adding the future target price (or index) to Dr. Netz's CPT actual-target price regressions causes the estimated coefficient on the current period target price (or index) to decline materially cannot be attributed to differences in the data samples.

⁹⁸ Willig Damages Report, ¶ 51 and Exhibit 10. I also presented similar evidence that the CPT target price index that Dr. Netz constructed is a poor predictor of the actual prices of non-targeted CPTs. Willig Damages Report, ¶ 52 and Exhibit 11.

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versus actual prices, any model of prices should include as controls all of the information available to Defendants when they set their actual prices.⁹⁹

63. Dr. Netz's response is completely misguided. The fact that adding control variables for supply and demand conditions could lead to a more accurate prediction of actual prices provides no information about whether the alleged cartel members adhered to the target prices. In theory, the alleged cartel members could have completely ignored the target prices but the supply and demand control variables might still allow one to predict actual prices with a great degree of accuracy. Conversely, if the alleged cartel members hewed closely to the CPT target prices, one should be able to predict actual CPT prices accurately from the target prices alone. Dr. Netz suggests that this is not the case because the alleged cartel members had more information about market conditions when they set actual prices than when they set target prices, but if changing market conditions often caused the alleged cartel members to deviate substantially from the previously established target prices, it implies that market conditions – not target prices – are what determined actual prices. Thus, my analysis separates the impact of alleged cartel conduct on prices from the impact of market forces on conduct, which is clearly desirable for the purposes of examining the effectiveness of the alleged cartel.
64. In sum, nothing in Dr. Netz's rebuttal report alters my conclusions that (a) Dr. Netz identified target prices for only a minority of global CPT sales, and for even fewer North American and large CPT sales that are highly relevant to any overcharges incurred by the U.S.-based IPP class members; and (b) the evidence on actual CPT pricing indicates that the alleged cartel members did not adhere to the alleged CPT target prices in a sustained or uniform manner, if at all.

⁹⁹ Netz Damages Rebuttal Report, p. 48.

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VII. Conclusion

I conclude that in her rebuttal report, Dr. Netz has failed to provide a valid defense of her fundamentally flawed approach to estimating overcharges. Even if Dr. Netz's flawed approach is employed to estimate damages, nothing in her rebuttal report undermines my view that simple extensions to her model that better control for market conditions lead to much smaller CPT overcharges than Dr. Netz's estimates. Consistent with this, Dr. Netz fails to establish that the pricing conduct of the alleged cartel members was typically consistent with the conduct alleged by Plaintiffs. In fact, the record evidence and my analysis indicate that alleged cartel members typically did not adhere to the pricing agreements alleged by Dr. Netz.

Executed on November 6, 2014


Robert D. Willig

Exhibit 1: Extensions to Dr. Netz's CPT Overcharge Estimation Model

Specification:		Overcharge (%)	
		1995-2006	2007
(a)	Netz Model	9.0%***	3.1%*
(b)	Netz Model with Additional Cost and Demand Control Variables (Willig Initial Damages Report)	2.3%	-3.8%**
(c)	Netz Model with Additional Cost and Demand Control Variables - and with IMF Fuel Index.	1.7%	-2.5%

Sources: (1) Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic Corporation, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba; (2) Bloomberg L.P., OECD StatExtracts Database, U.S. Census Bureau, Federal Reserve Bank of St. Louis, International Monetary Fund, Bank of Korea, DisplaySearch.

Notes: (1) "****" indicates statistical significance at 1%; "***" at 5%; "**" at 10%; (2) the overcharge relative to the actual price is calculated by first converting the regression coefficient to percent terms using the formula: $c = \exp(b - 0.5 V(b)) - 1$, where b is the coefficient on the cartel dummy and $V(b)$ is the variance of b . The overcharge as a percent of actual price is then calculated as $1 - 1/(1+c)$; (3) the following additional control variables were used in row (b): Korean labor cost index, USD-Korean Won exchange rate (i.e., the number of Korean Won in one U.S. dollar), Baltic Dry shipping cost index, and sales in US electronic and appliances stores; (4) the IMF fuel index is used in row (c) in addition to the control variables used in row (b).

Exhibit 2: Modifications to Dr. Netz's CPT Overcharge Estimation Model

Specification:		Large CPT Overcharges (≥26 inches)		Small CPT Overcharges (<26 inches)		Overall Average CPT Overcharges (with Negative Overcharges Set at Zero)	
		1995-2006	2007	1995-2006	2007	1995-2006	2007
(a)	Netz Model - Unmodified	N/A	N/A	N/A	N/A	9%***	3.1%*
(b)	Netz Model - by Size	3.9%	-0.6%	11.5%***	5.0%***	7.1%***	2.9%***
(c)	Netz Model - by Size and with Additional Demand and Control Variables	-1.7%	-6.4%**	4.5%**	-2.2%	1.9%**	0.0%

Sources: (1) Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic Corporation, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba; (2) Bloomberg L.P., OECD StatExtracts Database, U.S. Census Bureau, Federal Reserve Bank of St. Louis, International Monetary Fund, Bank of Korea, DisplaySearch.

Notes: (1) "****" indicates statistical significance at 1%; "***" at 5%; "*" at 10%; (2) the overcharge relative to the actual price is calculated by first converting the regression coefficient to percent terms using the formula: $c = \exp(b - 0.5 V(b)) - 1$, where b is the coefficient on the cartel dummy and $V(b)$ is the variance of b . The overcharge as a percent of actual price is then calculated as $1 - 1/(1+c)$; (3) the weighted average overcharge is calculated by using the relevant sales shares of large and small CPTs in Dr. Netz's estimation data (estimation_size.dta); (4) whenever the size-specific overcharge is negative, it is zeroed out in the calculation of the respective weighted average overcharge; (5) the following additional control variables were used in row (c): Korean labor cost index, USD-Korean Won exchange rate (i.e., the number of Korean Won in one U.S. dollar), Baltic Dry shipping cost index, and sales in US electronic and appliances stores; (6) Large CPTs are defined as CPTs that are at least 26 inches in actual diagonal length; (7) When IMF fuel cost is added to the model in (c), the weighted average overcharge is 1.6% for 1995-2006 and 0.0% for 2007.

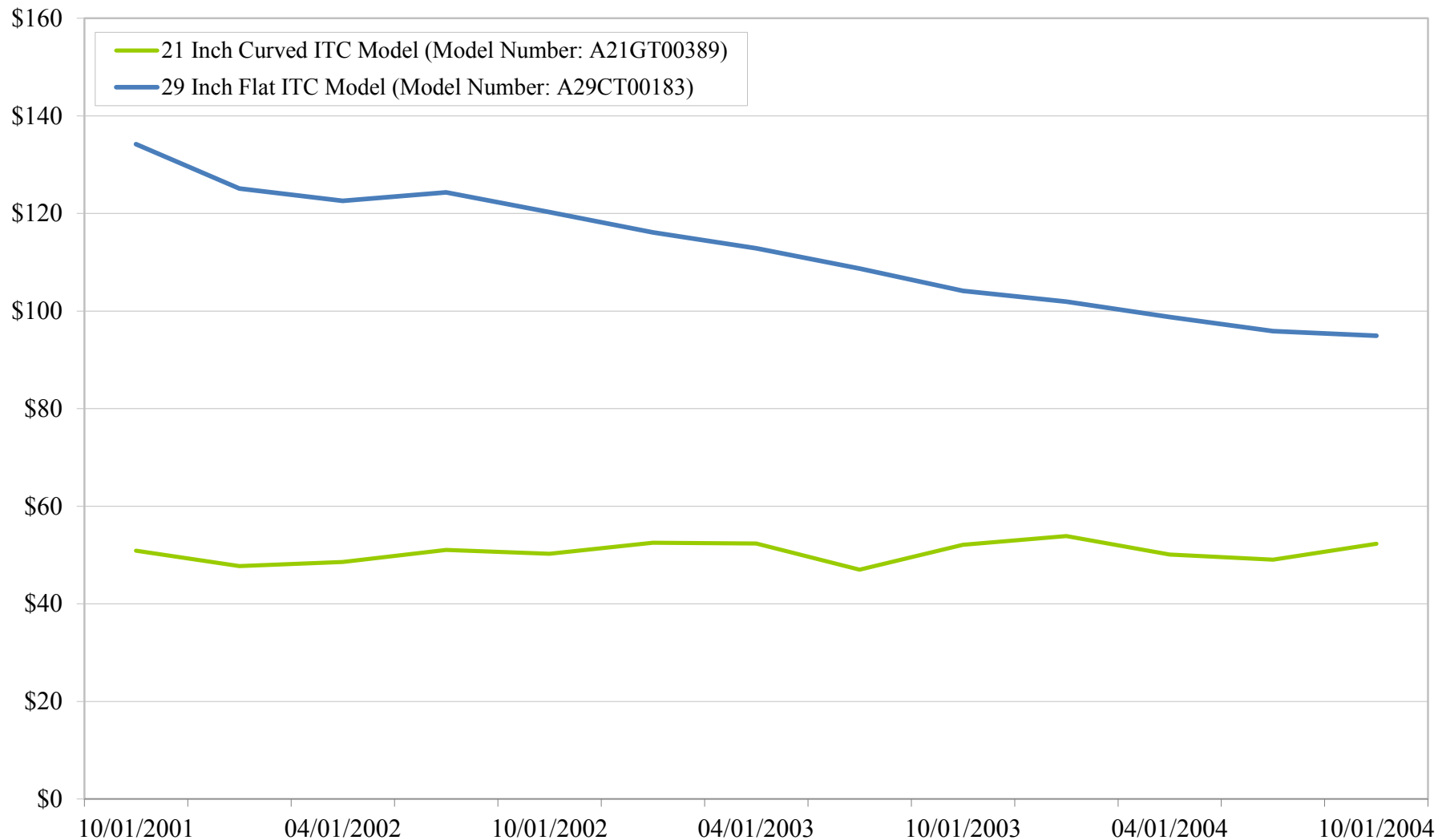
Exhibit 3: Application of Dr. Netz's CPT Overcharge Estimation Model to North American CPT Sales

Specification:		Overcharge (%)	
		1995-2006	2007
(a)	Netz Model - Unmodified	9.0%***	3.1%*
(b)	Netz Model - North America CPT Sales Only	5.2%**	1.4%
(c)	Netz Model with Additional Demand and Cost Control Variables - North American CPT Sales Only	2.0%	-2.8%

Sources: (1) Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic Corporation, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba; (2) U.S. Bureau of Labor Statistics, iSuppli Television Systems Market Tracker Database, U.S. Bureau of Economic Analysis, Bank of Korea, DisplaySearch, OECD StatExtracts Database.

Notes: (1) "****" indicates statistical significance at 1%; "***" at 5%; "*" at 10%; (2) the overcharge relative to the actual price is calculated by first converting the regression coefficient to percent terms using the formula: $c = \exp(b - 0.5 V(b)) - 1$, where b is the coefficient on the cartel dummy and $V(b)$ is the variance of b . The overcharge as a percent of actual price is then calculated as $1 - 1/(1+c)$; (3) rows (b) and (c) apply Dr. Netz's overcharge model to a dataset limited to North America sales; (4) the following additional control variables were used in row (c): U.S. pressed and blown glass PPI, U.S. GDP, U.S. unemployment rate, and LCD share of North American TV sales.

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Exhibit 4: SDI Quarterly Prices Over Time (ITC CPT Models)

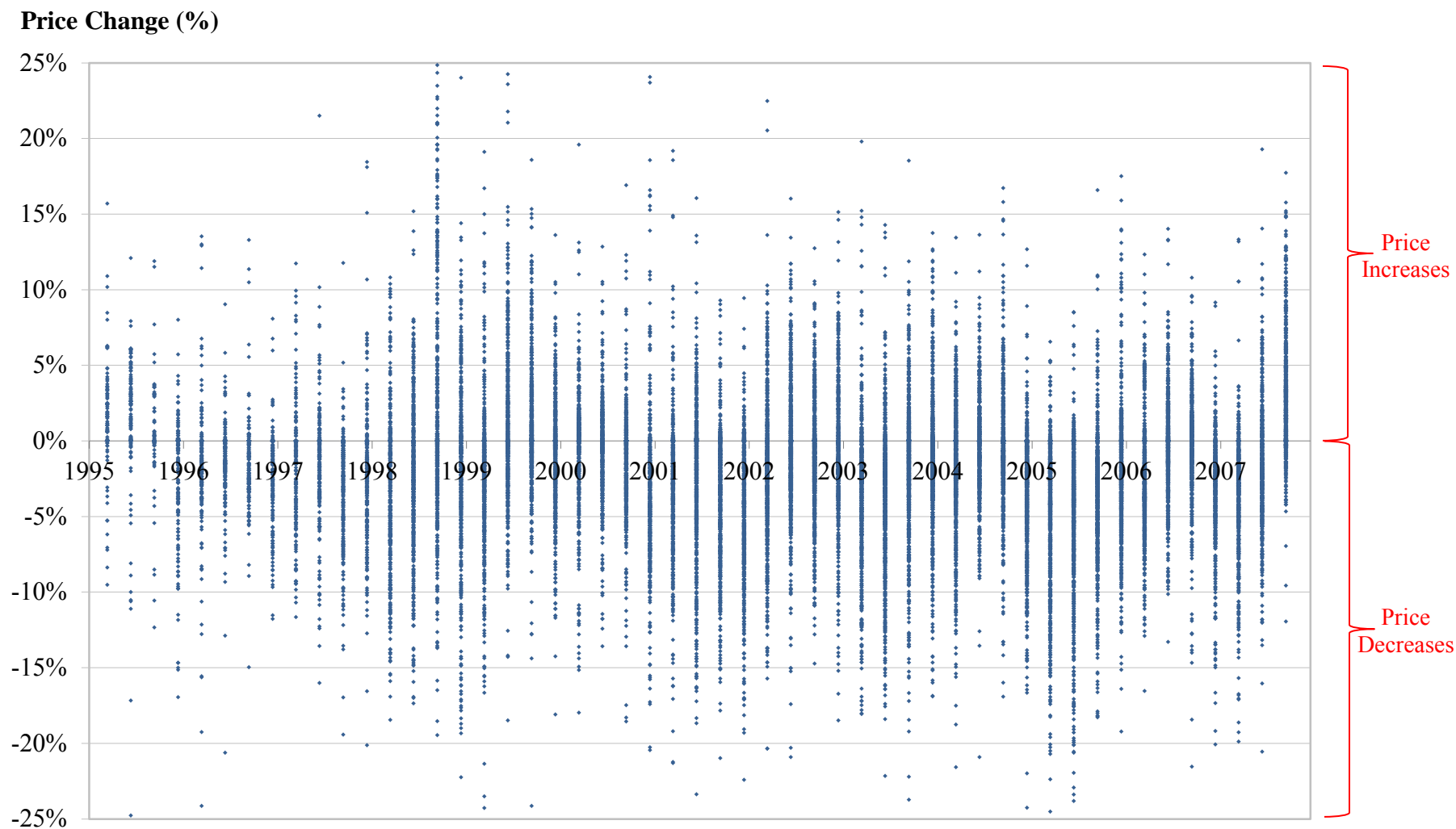
Source: Global CRT sales data for SDI.

Exhibit 4: Notes for SDI Quarterly Prices Over Time (ITC CPT Models)

Notes:

- (1) The lines represent the quarterly quantity-weighted average prices charged by SDI for one 21" curved ITC CPT model with 4:3 aspect ratio (A21GT00389) and one 29" flat ITC CPT model with 4:3 aspect ratio (A21GT00389);
- (2) A21GT00389 and A21GT00389 represent the two models that were sold for the longest overlapping time period among the top 15 selling models in their respective product groups. Their prices are displayed for the longest continuous period during which positive quantities of both models were sold;
- (3) Prices were excluded as outliers as follows: For each quarter in which a given CPT model produced in a given factory was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was produced in the same factory and sold to the same customer in the same currency. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, factory, customer, currency, and quarter were excluded as outliers if: (a) the price for the model, factory, customer, and currency experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which the same model was produced in the same factory and sold to the same customer, or vice versa; (b) it was the first quarter in which the model was produced at that factory and sold to that customer in that currency and the price experienced a very large increase or decrease in the next quarter in which the model was produced at that factory and sold to that customer in that currency; or (c) it was the last quarter in which the model was produced in that factory and sold to that customer in that currency and the price experienced a very large increase or decrease from the previous quarter in which the model was produced in that factory and sold to that customer in that currency.

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Exhibit 5-A: Heterogeneity in Quarterly Changes in CPT Prices

Source: Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic Corporation, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba

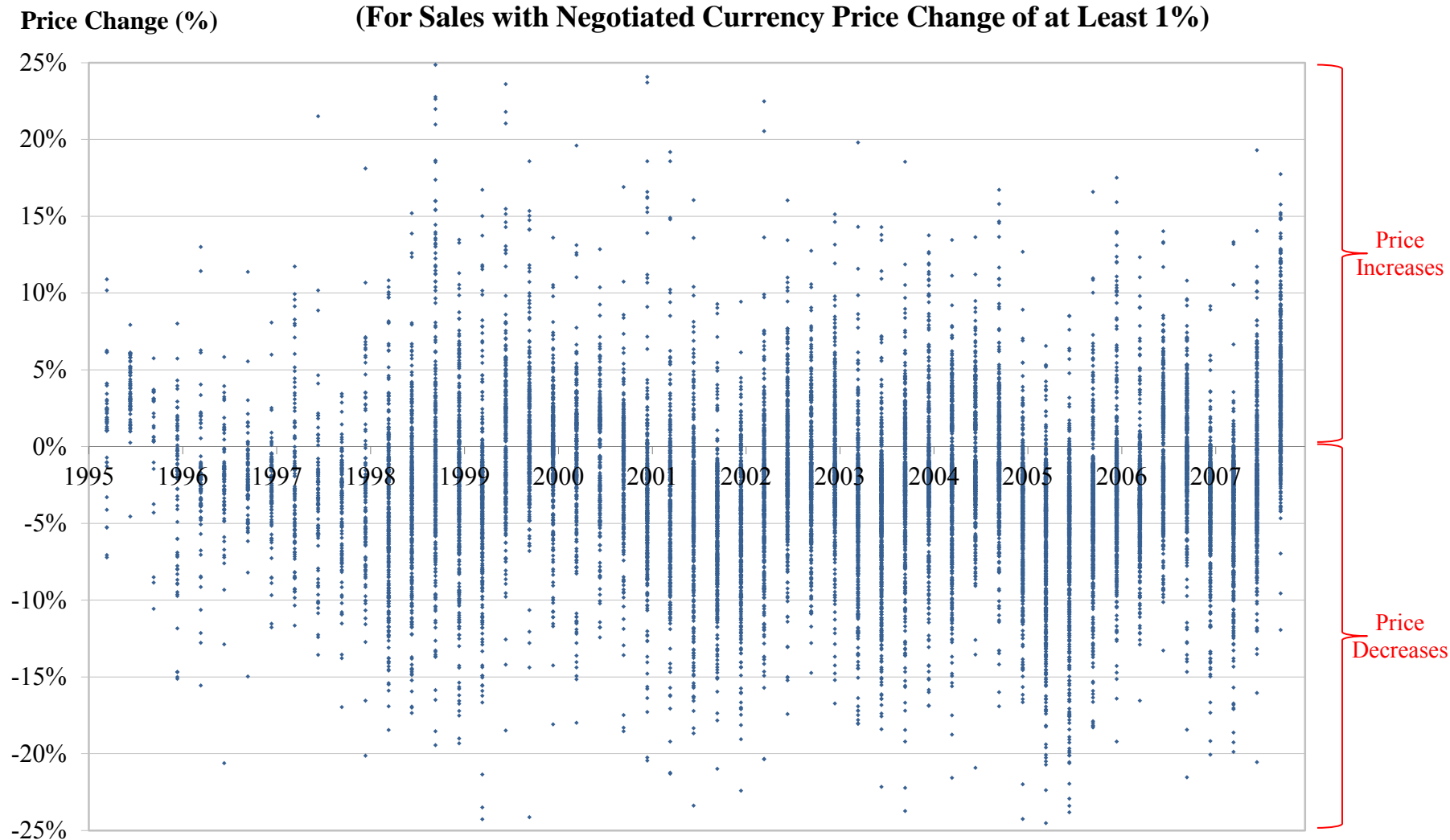
Exhibit 5-A: Notes for Heterogeneity in Quarterly Changes in CPT Prices

Notes:

- (1) A point on the above chart represents the quarter-to-quarter change in the price expressed in USD for a given CPT model, factory, customer, and the currency in which the prices were negotiated (the "negotiated currency") over two consecutive quarters using global CPT sales data for Q1 1995 to Q4 2007;
- (2) Prices were excluded as outliers as follows: For each quarter in which a given CPT model produced in a given factory was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was produced in the same factory and sold to the same customer in the same currency. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, factory, customer, currency, and quarter were excluded as outliers if: (a) the price for the model, factory, customer, and currency experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which the same model was produced in the same factory and sold to the same customer, or vice versa; (b) it was the first quarter in which the model was produced at that factory and sold to that customer in that currency and the price experienced a very large increase or decrease in the next quarter in which the model was produced at that factory and sold to that customer in that currency; or (c) it was the last quarter in which the model was produced in that factory and sold to that customer in that currency and the price experienced a very large increase or decrease from the previous quarter in which the model was produced in that factory and sold to that customer in that currency.
- (3) The following observations were also excluded: (a) observations for which the application, model number, customer name, negotiated currency, or quarter were missing; and (b) sales between integrated entities that sold CRTs.
- (4) A de minimis number of observations are outside the bounds of the y-axis.

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**Exhibit 5-B: Heterogeneity in Quarterly Changes in CPT Prices
(For Sales with Negotiated Currency Price Change of at Least 1%)**



Source: Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic Corporation, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba

Exhibit 5-B: Notes for Heterogeneity in Quarterly Changes in CPT Prices (For Sales with Negotiated Currency Price Change of at Least 1%)

Notes:

(1) A point on the above chart represents the quarter-to-quarter change in the price expressed in USD for a given CPT model, factory, customer, and the currency in which the prices were negotiated (the "negotiated currency") over two consecutive quarters using global CPT sales data for Q1 1995 to Q4 2007;

(2) Prices were excluded as outliers as follows: For each quarter in which a given CPT model produced in a given factory was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was produced in the same factory and sold to the same customer in the same currency. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, factory, customer, currency, and quarter were excluded as outliers if: (a) the price for the model, factory, customer, and currency experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which the same model was produced in the same factory and sold to the same customer, or vice versa; (b) it was the first quarter in which the model was produced at that factory and sold to that customer in that currency and the price experienced a very large increase or decrease in the next quarter in which the model was produced at that factory and sold to that customer in that currency; or (c) it was the last quarter in which the model was produced in that factory and sold to that customer in that currency and the price experienced a very large increase or decrease from the previous quarter in which the model was produced in that factory and sold to that customer in that currency.

(3) The following observations were also excluded: (a) observations for which the application, model number, customer name, negotiated currency, or quarter were missing; (b) sales between integrated entities that sold CRTs; and (c) observations for which the price in the negotiated currency changed by less than 1% from the price in the previous quarter.

(4) A de minimis number of observations are outside the bounds of the y-axis.

Exhibit 6-A: Heterogeneity of CRT Price Movements by Application, CPT Size, and CPT Shape

	Category 1	Category 2	Share of Products Pairs in Categories 1 and 2 whose Relative Price Changed by at least 5%
Differences Across Categories	CDT	CPT	37%
	Small CPT	Large CPT	31%
	Curved CPT	Flat CPT	32%
Differences Within Categories	CDT	CDT	34%
	CPT	CPT	29%
	Small CPT	Small CPT	26%
	Large CPT	Large CPT	33%
	Flat CPT	Flat CPT	29%
	Curved CPT	Curved CPT	30%

Source: Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic Corporation, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba

Exhibit 6-A: Notes for Heterogeneity of CRT Price Movements by Application, CPT Size, and CPT Shape

Notes:

- (1) An observation represents the quarter-to-quarter change in the price expressed in USD for a given CRT model, factory, customer, and the currency in which the prices were negotiated (the "negotiated currency"), over two consecutive quarters, using global CRT sales data for Q1 1995 to Q4 2007;
- (2) The average quantity associated with a given observation was calculated as the geometric mean of the quantity sold of the corresponding CRT model, factory, customer, and negotiated currency in each of the two quarters over which the price change was calculated;
- (3) The change in relative prices was calculated for all pairwise combinations of observations from Category 1 and Category 2, with the exception of combinations between an observation and itself, which were excluded when calculating differences within categories;
- (4) The weight for each pair of observations is defined as the geometric mean of the average quantity associated with each observation in the pair;
- (5) The share of relative price changes of at least 5% was determined using the pair-weights defined above;
- (6) Prices were excluded as outliers as follows: For each quarter in which a given CRT model produced in a given factory was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was produced in the same factory and sold to the same customer in the same currency. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, factory, customer, currency, and quarter were excluded as outliers if: (a) the price for the model, factory, customer, and currency experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which the same model was produced in the same factory and sold to the same customer, or vice versa; (b) it was the first quarter in which the model was produced at that factory and sold to that customer in that currency and the price experienced a very large increase or decrease in the next quarter in which the model was produced at that factory and sold to that customer in that currency; or (c) it was the last quarter in which the model was produced in that factory and sold to that customer in that currency and the price experienced a very large increase or decrease from the previous quarter in which the model was produced in that factory and sold to that customer in that currency;
- (7) The following observations were also excluded: (a) observations for which the application, model number, customer name, negotiated currency, or quarter were missing; and (b) sales between integrated entities that sold CRTs.
- (8) The results presented in both columns differ by less than one percentage point if Category 1 and Category 2 are interchanged.

Exhibit 6-B: Heterogeneity of CRT Price Movements by Application, CPT Size, and CPT Shape (For Sales with Negotiated Currency Price Change of at Least 1%)

	Category 1	Category 2	Share of Products Pairs in Categories 1 and 2 whose Relative Price Changed by at least 5%
Differences Across Categories	CDT	CPT	43%
	Small CPT	Large CPT	35%
	Curved CPT	Flat CPT	37%
Differences Within Categories	CDT	CDT	39%
	CPT	CPT	34%
	Small CPT	Small CPT	31%
	Large CPT	Large CPT	37%
	Flat CPT	Flat CPT	33%
	Curved CPT	Curved CPT	35%

Source: Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic Corporation, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba

Exhibit 6-B: Notes for Heterogeneity of CRT Price Movements by Application, CPT Size, and CPT Shape (For Sales with Negotiated Currency Price Change of at Least 1%)

Notes:

(1) An observation represents the quarter-to-quarter change in the price expressed in USD for a given CRT model, factory, customer, and the currency in which the prices were negotiated (the "negotiated currency"), over two consecutive quarters, using global CRT sales data for Q1 1995 to Q4 2007;

The average quantity associated with a given observation was calculated as the geometric mean of the quantity sold of the corresponding CRT model, factory, customer, and negotiated currency in each of the two quarters over which the price change was calculated;

(3) The change in relative prices was calculated for all pairwise combinations of observations from Category 1 and Category 2, with the exception of combinations between an observation and itself, which were excluded when calculating differences within categories;

(4) The weight for each pair of observations is defined as the geometric mean of the average quantity associated with each observation in the pair;

(5) The share of relative price changes of at least 5% was determined using the pair-weights defined above;

(6) Prices were excluded as outliers as follows: For each quarter in which a given CRT model produced in a given factory was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was produced in the same factory and sold to the same customer in the same currency. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, factory, customer, currency, and quarter were excluded as outliers if: (a) the price for the model, factory, customer, and currency experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which the same model was produced in the same factory and sold to the same customer, or vice versa; (b) it was the first quarter in which the model was produced at that factory and sold to that customer in that currency and the price experienced a very large increase or decrease in the next quarter in which the model was produced at that factory and sold to that customer in that currency; or (c) it was the last quarter in which the model was produced in that factory and sold to that customer in that currency and the price experienced a very large increase or decrease from the previous quarter in which the model was produced in that factory and sold to that customer in that currency;

(7) The following observations were also excluded: (a) observations for which the application, model number, customer name, negotiated currency, or quarter were missing; (b) sales between integrated entities that sold CRTs; and (c) observations for which the price in negotiated currency changed by less than 1% from the price in the previous quarter.

(8) The results presented in both columns differ by less than one percentage point if Category 1 and Category 2 are interchanged.

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Exhibit 7: Regressions of Changes in Actual Prices on Changes in Target Prices

Row	Dependent Variable	Independent Variables			Large CPTs	Small and Medium CPTs	Prices Not Matched Based on Shape			Prices Matched Based on Shape		
	Change in Actual Price (Level of Aggregation)	Change in Alleged Target Price (Level of Aggregation)	Change in Macro-economic Variables	Change in Negotiated Price Currency-to-USD Exchange Rate Variables			Number of Observations	Estimated Coefficient on Change in Target Price	R-Squared	Number of Observations	Estimated Coefficient on Change in Target Price	R-Squared
1	Model, Factory, Customer, Quarter	Manufacturer, Application, Size, Finish, Shape (where applicable), Quarter					6,815	0.211***	0.039	4,611	0.282***	0.056
2	Model, Factory, Customer, Currency, Quarter	Manufacturer, Application, Size, Finish, Shape (where applicable), Quarter	X	X			6,474	0.106***	0.221	4,334	0.156***	0.215
3	Model, Factory, Customer, Quarter	Manufacturer, Application, Size, Finish, Shape (where applicable), Quarter			X		1,164	-0.0845	0.002	834	-0.306***	0.019
4	Model, Factory, Customer, Quarter	Manufacturer, Application, Size, Finish, Shape (where applicable), Quarter				X	5,651	0.221***	0.048	3,777	0.307***	0.074

Sources: (1) Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic Corporation, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba; (2) Netz target price data; (3) OECD StatExtracts Database (OECD unemployment rate and industrial production), Bank of Korea (Korean CRT glass PPI), DisplaySearch (worldwide TV sales by technology), U.S. Federal Reserve (exchange rates).

Exhibit 7: Notes for Regressions of Changes in Actual Price on Changes in Target Price

Notes:

- (1) An actual price observation represents the quantity-weighted average actual price for a given model, factory, customer, and quarter (rows 1, 3, and 4) or for a given model, customer, factory, the currency in which the prices were negotiated ("negotiated currency"), and quarter (row 2) using global CPT sales data for Q1 1995 to Q4 2007;
- (2) A target price observation represents the average of the CPT target prices identified by Dr. Netz for a given manufacturer, size, finish (in addition to shape when applicable), (collectively, "group") and quarter, weighted by the number of days that the target price was effective during that quarter. The average target prices are the same as those used by Dr. Netz, except to the extent that they are disaggregated by shape;
- (3) Actual and target price changes represent the average quarterly percentage change (divided by 100) in the actual price for a given model, factory, and customer (and negotiated currency in row 2) and the average quarterly percentage change (divided by a hundred) in the CPT target price for the group between quarters t and $t-x$, where x is defined as the smallest positive integer (possibly equal to 1) for which there were actual prices for the model-factory-customer (and currency in row 2) and target prices for the group in quarters t and $t-x$. That is, the actual and target prices changes were calculated over the same period of time, and x represents the shortest period over which this was possible;
- (4) Actual prices were excluded as outliers as follows: For each quarter in which a given CPT model produced in a given factory was sold to a given customer, the average quarterly price change was calculated between the given quarter and the previous quarter in which the same model was produced in the same factory and sold to the same customer. Price changes that were less than the 25th percentile of the distribution of price changes across all defendants minus 3 times the interquartile range of that distribution or greater than the 75th percentile of the distribution plus 3 times the interquartile range were flagged as "very large price decreases" or "very large price increases," respectively. Prices for a given model, factory, customer, and quarter were excluded as outliers if: (a) the price for the model, factory, and customer experienced a very large decrease in the given quarter followed by a very large increase in the next quarter in which the same model was produced in the same factory and sold to the same customer, or vice versa; (b) it was the first quarter in which the model was produced at that factory and sold to that customer and the price experienced a very large increase or decrease in the next quarter in which the model was produced at that factory and sold to that customer; or (c) it was the last quarter in which the model was produced in that factory and sold to that customer and the price experienced a very large increase or decrease from the previous quarter in which the model was produced in that factory and sold to that customer;
- (5) The following actual price observations were also excluded: (a) observations for which the model number, customer name, or quarter (or currency for the model presented in row 2 or shape when applicable) were missing; (b) sales between integrated entities that sold CRTs; and (c) observations with more than four quarters between observed pairs of actual price changes and target price changes.

** Notes continued on next page.*

Exhibit 7: Notes (Continued) for Regressions of Changes in Actual Price on Changes in Target Price

Notes (continued):

- (6) The macroeconomic variables included in the model presented in row 2 are: (a) the unemployment rate and industrial production for Organization for Economic Co-operation and Development ("OECD") countries; (b) the Korean CRT glass producer price index ("PPI"); and (c) the quarterly LCD share of worldwide TV revenue. The changes in the Korean glass PPI and the OECD industrial production represent the average quarterly percentage changes (divided by a hundred) in that variable between quarters t and $t-x$, where t and x are defined according to Note #3 above. The changes in the OECD unemployment rate and LCD market share represent the average quarterly percentage point changes in that variable between quarters t and $t-x$;
- (7) The exchange rate used in row 2 represents the ratio for quarter t between the average price in the negotiated currency and the U.S. dollar average price for a given model, factory, customer, and negotiated currency. The change in the exchange rate represents the percentage change (divided by a hundred) in the exchange rate between quarters t and $t-x$, where t and x are defined according to Note #3 above. The model presented in row 2 includes the change in the exchange rate and interactions between this variable and a series of eight "dummy" variables that take the value 1 if the currency in which the actual price was negotiated is the Deutsche Mark, Euro, Japanese Yen, South Korean Won, Malaysian Ringgit, Chinese Yuan, Taiwan New Dollar, or U.S. Dollar respectively, and zero otherwise. To avoid collinearity there is no dummy variable that equals 1 for prices negotiated in Brazil Real;
- (8) "Large CPTs" refers to CPTs with an actual diagonal size of at least 26 inches. "Small and Medium CPTs" refers to all other CPTs.
- (9) (***) indicates that the estimated coefficient is different from zero at the 1% significance level.

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Exhibit 8: Effect of Adding Future Target Price Coefficient to Netz Target Price Regressions

Regression	Netz Regression Results	Addition of Next Quarter (Future) Target Price	
	Target Price Coefficient	Target Price Coefficient	Next Quarter Target Price Coefficient
Netz Exhibit 38 (Target Prices)	0.342***	0.148***	0.250***
Netz Exhibit 45 (Target Price Index)	0.196***	-0.005	0.310***

Sources: (1) Global CRT sales data for Chunghwa, Daewoo, Hitachi, IRICO, LGE, LPD, Mitsubishi, MTPD, Panasonic Corporation, Philips, SDI, Samtel, Thai CRT, Thomson, and Toshiba; (2) Netz target price data; (3) OECD StatExtracts Database (OECD unemployment rate and industrial production), Bank of Korea (Korean CRT glass PPI).

Notes: (1) "****" indicates statistical significance at 1%; "***" at 5%; "*" at 10%; (2) Dr. Netz regresses actual prices on target prices in Exhibit 38, and regresses actual prices on a target price index in Exhibit 45. Both models also include the previous quarter's actual price, OECD unemployment rate, OECD industrial production, Korean glass PPI multiplied by CPT size, and fixed effects by customer, manufacturer, size, finish, and factory.

ATTACHMENT 1

November 2014

Curriculum Vitae

Name: **Robert D. Willig**

Address: 220 Ridgeview Road, Princeton, New Jersey 08540

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Education: Ph.D. Economics, Stanford University, 1973
Dissertation: Welfare Analysis of Policies
Affecting Prices and Products.
Advisor: James Rosse

M.S. Operations Research, Stanford University, 1968.

A.B. Mathematics, Harvard University, 1967.

Professional Positions:

Professor of Economics and Public Affairs, Princeton University, 1978-.

Principal External Advisor, Infrastructure Program, Inter-American Development Bank, 6/97-8/98.

Deputy Assistant Attorney General, U.S. Department of Justice, 1989-1991.

Supervisor, Economics Research Department, Bell Laboratories, 1977-1978.

Visiting Lecturer (with rank of Associate Professor), Department of Economics and Woodrow Wilson School, Princeton University, 1977-78 (part time).

Economics Research Department, Bell Laboratories, 1973-77.

Lecturer, Economics Department, Stanford University, 1971-73.

Other Professional Activities

ABA Section of Antitrust Law Economics Task Force, 2010-2012

Advisory Committee, Compass Lexecon 2010 -

OECD Advisory Council for Mexican Economic Reform, 2008 - 2009

Senior Consultant, Compass Lexecon, 2008 -

Director, Competition Policy Associates, Inc., 2003-2005

Advisory Bd., Electronic Journal of I.O. and Regulation Abstracts, 1996-2008.

Advisory Board, Journal of Network Industries, 2004-2010.

Visiting Faculty Member (occasional), International Program on Privatization and Regulatory Reform, Harvard Institute for International Development, 1996-2000.

Member, National Research Council Highway Cost Allocation Study Review Committee, 1995-98.

Member, Defense Science Board Task Force on the Antitrust Aspects of Defense Industry Consolidation, 1993-94.

Editorial Board, Utilities Policy, 1990-2001.

Leif Johanson Lecturer, University of Oslo, November 1988.

Member, New Jersey Governor's Task Force on Market-Based Pricing of Electricity, 1987-89.

Co-editor, Handbook of Industrial Organization, 1984-89.

Associate Editor, Journal of Industrial Economics, 1984-89.

Director, Consultants in Industry Economics, Inc., 1983-89, 1991-94.

Fellow, Econometric Society, 1981-.

Organizing Committee, Carnegie-Mellon-N.S.F. Conference on Regulation, 1985.

Board of Editors, American Economic Review, 1980-83.

Nominating Committee, American Economic Association, 1980-1981.

Research Advisory Committee, American Enterprise Institute, 1980-1986.

Editorial Board, M.I.T. Press Series on Government Regulation of Economic Activity, 1979-93.

Program Committee, 1980 World Congress of the Econometric Society.

Program Committee, Econometric Society, 1979, 1981, 1985.

Organizer, American Economic Association Meetings: 1980, 1982.

American Bar Association Section 7 Clayton Act Committee, 1981.

Principal Investigator, NSF grant SOC79-0327, 1979-80; NSF grant 285-6041, 1980-82; NSF grant SES-8038866, 1983-84, 1985-86.

Aspen Task Force on the Future of the Postal Service, 1978-80.

Organizing Committee of Sixth Annual Telecommunications Policy Research Conference, 1977-78.

Visiting Fellow, University of Warwick, July 1977.

Institute for Mathematical Studies in the Social Sciences, Stanford University, 1975.

Published Articles and Book Chapters:

"Unilateral Competitive Effects" (with Bryan Keating), in The Oxford Handbook on International Antitrust Economics, (Roger D. Blair and D. Daniel Sokol, eds.), Oxford University Press, forthcoming 2014.

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Invited Conference Presentations:

Brookings Institution Conference on The Economics of the Airline Industry "Airline Network Effects and Consumer Welfare"	2012
AGEP Public Policy Conference on Pharmaceutical Industry Economics, Regulation and Legal Issues; Law and Economics Center, George Mason University School of Law "Pharmaceutical Brand-Generic Disputes"	2012
U.S.-EU Alliance Study Peer Review Conferences "Review of Cooperative Agreements in Transatlantic Airline Markets"	2012
"The Research Agenda Ahead"	2012
Antitrust in the High Tech Sector Conference "Developments in Merger Enforcement"	2012
Georgetown Center for Business and Public Policy, Conference on the Evolution of Regulation "Reflections on Regulation"	2011
Antitrust Forum, New York State Bar Association "Upward Price Pressure, Market Definition and Supply Mobility"	2011
American Bar Association, Antitrust Section, Annual Convention "The New Merger Guidelines' Analytic Highlights"	2011
OECD and World Bank Conference on Challenges and Policies for Promoting Inclusive Growth "Inclusive Growth From Competition and Innovation"	2011
Villanova School of Business Executive MBA Conference "Airline Network Effects, Competition and Consumer Welfare"	2011
NYU School of Law Conference on Critical Directions in Antitrust "Unilateral Competitive Effects"	2010
Conf. on the State of European Competition Law and Enforcement in a Transatlantic Context "Recent Developments in Merger Control"	2010
Center on Regulation and Competition, Universidad de Chile Law School "Economic Regulation and the Limits of Antitrust Law"	2010
Center on Regulation and Competition, Universidad de Chile Law School "Merger Policy and Guidelines Revision"	2010
Faculty of Economics, Universidad de Chile "Network Effects in Airlines Markets"	2010

Georgetown Law Global Antitrust Enforcement Symposium "New US Merger Guidelines"	2010
FTI London Financial Services Conference "Competition and Regulatory Reform"	2010
NY State Bar Association Annual Antitrust Conference "New Media Competition Policy"	2009
Antitrust Law Spring Meeting of the ABA "Antitrust and the Failing Economy Defense"	2009
Georgetown Law Global Antitrust Enforcement Symposium "Mergers: New Enforcement Attitudes in a Time of Economic Challenge"	2009
Phoenix Center US Telecoms Symposium "Assessment of Competition in the Wireless Industry"	2009
FTC and DOJ Horizontal Merger Guidelines Workshop "Direct Evidence is No Magic Bullet"	2009
Northwestern Law Research Symposium: Antitrust Economics and Competition Policy "Discussion of Antitrust Evaluation of Horizontal Mergers"	2008
Inside Counsel Super-Conference "Navigating Mixed Signals under Section 2 of the Sherman Act"	2008
Federal Trade Commission Workshop on Unilateral Effects in Mergers "Best Evidence and Market Definition"	2008
European Policy Forum, Rules for Growth: Telecommunications Regulatory Reform "What Kind of Regulation For Business Services?"	2007
Japanese Competition Policy Research Center, Symposium on M&A and Competition Policy "Merger Policy Going Forward With Economics and the Economy"	2007
Federal Trade Commission and Department of Justice Section 2 Hearings "Section 2 Policy and Economic Analytic Methodologies"	2007
Pennsylvania Bar Institute, Antitrust Law Committee CLE "The Economics of Resale Price Maintenance and Class Certification"	2007
Pennsylvania Bar Institute, Antitrust Law Committee CLE "Antitrust Class Certification – An Economist’s Perspective"	2007

Fordham Competition Law Institute, International Competition Economics Training Seminar “Monopolization and Abuse of Dominance”	2007
Canadian Bar Association Annual Fall Conference on Competition Law “Economic Tools for the Competition Lawyer”	2007
Conference on Managing Litigation and Business Risk in Multi-jurisdiction Antitrust Matters “Economic Analysis in Multi-jurisdictional Merger Control”	2007
World Bank Conference on Structuring Regulatory Frameworks for Dynamic and Competitive South Eastern European Markets “The Roles of Government Regulation in a Dynamic Economy”	2006
Department of Justice/Federal Trade Commission Section 2 Hearings “(Allegedly) Monopolizing Tying Via Product Innovation”	2006
Fordham Competition Law Institute, Competition Law Seminar “Monopolization and Abuse of Dominance”	2006
Practicing Law Institute on Intellectual Property Antitrust “Relevant Markets for Intellectual Property Antitrust”	2006
PLI Annual Antitrust Law Institute “Cutting Edge Issues in Economics”	2006
World Bank’s Knowledge Economy Forum V “Innovation, Growth and Competition”	2006
Charles University Seminar Series “The Dangers of Over-Ambitious Antitrust Regulation”	2006
NY State Bar Association Antitrust Law Section Annual Meeting “Efficient Integration or Illegal Monopolization?”	2006
World Bank Seminar “The Dangers of Over-Ambitious Regulation”	2005
ABA Section of Antitrust Law 2005 Fall Forum “Is There a Gap Between the Guidelines and Agency Practice?”	2005
Hearing of Antitrust Modernization Commission “Assessment of U.S. Merger Enforcement Policy”	2005
LEAR Conference on Advances in the Economics of Competition Law “Exclusionary Pricing Practices”	2005

Annual Antitrust Law Institute “Cutting Edge Issues in Economics”	2005
PRIOR Symposium on States and Stem Cells “Assessing the Economics of State Stem Cell Programs”	2005
ABA Section of Antitrust Law – AALS Scholars Showcase “Distinguishing Anticompetitive Conduct”	2005
Allied Social Science Associations National Convention “Antitrust in the New Economy”	2005
ABA Section of Antitrust Law 2004 Fall Forum “Advances in Economic Analysis of Antitrust”	2004
Phoenix Center State Regulator Retreat “Regulatory Policy for the Telecommunications Revolution”	2004
OECD Competition Committee “Use of Economic Evidence in Merger Control”	2004
Justice Department/Federal Trade Commission Joint Workshop “Merger Enforcement”	2004
Phoenix Center Annual U.S. Telecoms Symposium “Incumbent Market Power”	2003
Center for Economic Policy Studies Symposium on Troubled Industries “What Role for Government in Telecommunications?”	2003
Princeton Workshop on Price Risk and the Future of the Electric Markets “The Structure of the Electricity Markets”	2003
2003 Antitrust Conference “International Competition Policy and Trade Policy”	2003
International Industrial Organization Conference “Intellectual Property System Reform”	2003
ABA Section of Antitrust Law 2002 Fall Forum “Competition, Regulation and Pharmaceuticals”	2002

Fordham Conference on International Antitrust Law and Policy	
“Substantive Standards for Mergers and the Role of Efficiencies”	2002
Department of Justice Telecom Workshop	
“Stimulating Investment and the Telecommunications Act of 1996”	2002
Department of Commerce Conference on the State of the Telecom Sector	
“Stimulating Investment and the Telecommunications Act of 1996”	2002
Law and Public Affairs Conference on the Future of Internet Regulation	
“Open Access and Competition Policy Principles”	2002
Center for Economic Policy Studies Symposium on Energy Policy	
“The Future of Power Supply”	2002
The Conference Board: Antitrust Issues in Today’s Economy	
“The 1982 Merger Guidelines at 20”	2002
Federal Energy Regulatory Commission Workshop	
“Effective Deregulation of Residential Electric Service”	2001
IPEA International Seminar on Regulation and Competition	
“Electricity Markets: Deregulation of Residential Service”	2001
“Lessons for Brazil from Abroad”	2001
ABA Antitrust Law Section Task Force Conference	
“Time, Change, and Materiality for Monopolization Analyses”	2001
Harvard University Conference on American Economic Policy in the 1990s	
“Comments on Antitrust Policy in the Clinton Administration”	2001
Tel-Aviv Workshop on Industrial Organization and Anti-Trust	
“The Risk of Contagion from Multimarket Contact”	2001
2001 Antitrust Conference	
“Collusion Cases: Cutting Edge or Over the Edge?”	2001
“Dys-regulation of California Electricity”	2001
FTC Public Workshop on Competition Policy for E-Commerce	
“Necessary Conditions for Cooperation to be Problematic”	2001
HIID International Workshop on Infrastructure Policy	
“Infrastructure Privatization and Regulation”	2000
Villa Mondragone International Economic Seminar	
“Competition Policy for Network and Internet Markets”	2000

New Developments in Railroad Economics: Infrastructure Investment and Access Policies “Railroad Access, Regulation, and Market Structure”	2000
The Multilateral Trading System at the Millennium “Efficiency Gains From Further Liberalization”	2000
Singapore – World Bank Symposium on Competition Law and Policy “Policy Towards Cartels and Collusion”	2000
CEPS: Is It a New World?: Economic Surprises of the Last Decade “The Internet and E-Commerce”	2000
Cutting Edge Antitrust: Issues and Enforcement Policies “The Direction of Antitrust Entering the New Millennium”	2000
The Conference Board: Antitrust Issues in Today’s Economy “Antitrust Analysis of Industries With Network Effects”	1999
CEPS: New Directions in Antitrust “Antitrust in a High-Tech World”	1999
World Bank Meeting on Competition and Regulatory Policies for Development “Economic Principles to Guide Post-Privatization Governance”	1999
1999 Antitrust Conference “Antitrust and the Pace of Technological Development” “Restructuring the Electric Utility Industry”	1999 1999
HIID International Workshop on Privatization, Regulatory Reform and Corporate Governance “Privatization and Post-Privatization Regulation of Natural Monopolies”	1999
The Federalist Society: Telecommunications Deregulation: Promises Made, Potential Lost? “Grading the Regulators”	1999
Inter-American Development Bank: Second Generation Issues In the Reform Of Public Services “Post-Privatization Governance” “Issues Surrounding Access Arrangements”	1999 1999
Economic Development Institute of the World Bank -- Program on Competition Policy “Policy Towards Horizontal Mergers”	1998
Twenty-fifth Anniversary Seminar for the Economic Analysis Group of the Department of	

Justice	
“Market Definition in Antitrust Analysis”	1998
HIID International Workshop on Privatization, Regulatory Reform and Corporate Governance	
“Infrastructure Architecture and Regulation: Railroads”	1998
EU Committee Competition Conference – Market Power	
“US/EC Perspective on Market Definition”	1998
Federal Trade Commission Roundtable	
“Antitrust Policy for Joint Ventures”	1998
1998 Antitrust Conference	
“Communications Mergers”	1998
The Progress and Freedom Foundation Conference on Competition, Convergence, and the Microsoft Monopoly	
Access and Bundling in High-Technology Markets	1998
FTC Program on The Effective Integration of Economic Analysis into Antitrust Litigation	
The Role of Economic Evidence and Testimony	1997
FTC Hearings on Classical Market Power in Joint Ventures	
Microeconomic Analysis and Guideline	1997
World Bank Economists --Week IV Keynote	
Making Markets More Effective With Competition Policy	1997
Brookings Trade Policy Forum	
Competition Policy and Antidumping: The Economic Effects	1997
University of Malaya and Harvard University Conference on The Impact of Globalisation and Privatisation on Malaysia and Asia in the Year 2020	
Microeconomics, Privatization, and Vertical Integration	1997
ABA Section of Antitrust Law Conference on The Telecommunications Industry	
Current Economic Issues in Telecommunications	1997
Antitrust 1998: The Annual Briefing	
The Re-Emergence of Distribution Issues	1997
Inter-American Development Bank Conference on Private Investment, Infrastructure Reform and Governance in Latin America & the Caribbean	
Economic Principles to Guide Post-Privatization Governance	1997

Harvard Forum on Regulatory Reform and Privatization of Telecommunications in the Middle East	
Privatization: Methods and Pricing Issues	1997
American Enterprise Institute for Public Policy Research Conference	
Discussion of Local Competition and Legal Culture	1997
Harvard Program on Global Reform and Privatization of Public Enterprises	
“Infrastructure Privatization and Regulation: Freight”	1997
World Bank Competition Policy Workshop	
“Competition Policy for Entrepreneurship and Growth”	1997
Eastern Economics Association Paul Samuelson Lecture	
“Bottleneck Access in Regulation and Competition Policy”	1997
ABA Annual Meeting, Section of Antitrust Law	
“Antitrust in the 21st Century: The Efficiencies Guidelines”	1997
Peruvian Ministry of Energy and Mines Conference on Regulation of Public Utilities	
“Regulation: Theoretical Context and Advantages vs. Disadvantages”	1997
The FCC: New Priorities and Future Directions	
“Competition in the Telecommunications Industry”	1997
American Enterprise Institute Studies in Telecommunications Deregulation	
“The Scope of Competition in Telecommunications”	1996
George Mason Law Review Symposium on Antitrust in the Information Revolution	
“Introduction to the Economic Theory of Antitrust and Information”	1996
Korean Telecommunications Public Lecture	
“Market Opening and Fair Competition”	1996
Korea Telecommunications Forum	
“Desirable Interconnection Policy in a Competitive Market”	1996
European Association for Research in Industrial Economics Annual Conference	
“Bottleneck Access: Regulation and Competition Policy”	1996
Harvard Program on Global Reform and Privatization of Public Enterprises	
“Railroad and Other Infrastructure Privatization”	1996

FCC Forum on Antitrust and Economic Issues Involved with InterLATA Entry “The Scope of Telecommunications Competition”	1996
Citizens for a Sound Economy Policy Watch on Telecommunications Interconnection “The Economics of Interconnection”	1996
World Bank Seminar on Experiences with Corporatization “Strategic Directions of Privatization”	1996
FCC Economic Forum on the Economics of Interconnection Lessons from Other Industries	1996
ABA Annual Meeting, Section of Antitrust Law The Integration, Disintegration, and Reintegration of the Entertainment Industry	1996
Conference Board: 1996 Antitrust Conference How Economics Influences Antitrust and Vice Versa	1996
Antitrust 1996: A Special Briefing Joint Ventures and Strategic Alliances	1996
New York State Bar Association Section of Antitrust Law Winter Meeting Commentary on Horizontal Effects Issues	1996
FTC Hearings on the Changing Nature of Competition in a Global and Innovation-Driven Age Vertical Issues for Networks and Standards	1995
Wharton Seminar on Applied Microeconomics Access Policies with Imperfect Regulation	1995
Antitrust 1996, Washington D.C. Assessing Joint Ventures for Diminution of Competition	1995
ABA Annual Meeting, Section of Antitrust Law Refusals to Deal -- Economic Tests for Competitive Harm	1995
FTC Seminar on Antitrust Enforcement Analysis Diagnosing Collusion Possibilities	1995
Philadelphia Bar Education Center: Antitrust Fundamentals Antitrust--The Underlying Economics	1995
Vanderbilt University Conference on Financial Markets	

Why Do Christie and Schultz Infer Collusion From Their Data?	1995
ABA Section of Antitrust Law Chair=s Showcase Program Discussion of Telecommunications Competition Policy	1995
Conference Board: 1995 Antitrust Conference Analysis of Mergers and Joint Ventures	1995
ABA Conference on The New Antitrust: Policy of the '90s Antitrust on the Super Highways/Super Airways	1994
ITC Hearings on The Economic Effects of Outstanding Title VII Orders "The Economic Impacts of Antidumping Policies"	1994
OECD Working Conference on Trade and Competition Policy "Empirical Evidence on The Nature of Anti-dumping Actions"	1994
Antitrust 1995, Washington D.C. "Rigorous Antitrust Standards for Distribution Arrangements"	1994
ABA -- Georgetown Law Center: Post Chicago-Economics: New Theories - New Cases? "Economic Foundations for Vertical Merger Guidelines"	1994
Conference Board: Antitrust Issues in Today's Economy "New Democrats, Old Agencies: Competition Law and Policy"	1994
Federal Reserve Board Distinguished Economist Series "Regulated Private Enterprise Versus Public Enterprise"	1994
Institut d'Etudes Politiques de Paris "Lectures on Competition Policy and Privatization"	1993
Canadian Bureau of Competition Policy Academic Seminar Series, Toronto. "Public Versus Regulated Private Enterprise"	1993
CEPS Symposium on The Clinton Administration: A Preliminary Report Card "Policy Towards Business"	1993
Columbia Institute for Tele-Information Conference on Competition in Network Industries, New York, NY "Discussion of Deregulation of Networks: What Has Worked and What Hasn't"	1993
World Bank Annual Conference on Development Economics "Public Versus Regulated Private Enterprise"	1993

Center for Public Utilities Conference on Current Issues Challenging the Regulatory Process	
"The Economics of Current Issues in Telecommunications Regulation"	1992
"The Role of Markets in Presently Regulated Industries"	1992
The Conference Board's Conference on Antitrust Issues in Today's Economy, New York, NY	
"Antitrust in the Global Economy"	1992
"Monopoly Issues for the '90s"	1993
Columbia University Seminar on Applied Economic Theory, New York, NY	
"Economic Rationales for the Scope of Privatization"	1992
Howrey & Simon Conference on Antitrust Developments, Washington, DC	
"Competitive Effects of Concern in the Merger Guidelines"	1992
Arnold & Porter Colloquium on Merger Enforcement, Washington, DC	
"The Economic Foundations of the Merger Guidelines"	1992
American Bar Association, Section on Antitrust Law Leadership Council Conference, Monterey, CA	
"Applying the 1992 Merger Guidelines"	1992
OECD Competition Policy Meeting, Paris, France	
"The Economic Impacts of Antidumping Policy"	1992
Center for Public Choice Lecture Series, George Mason University Arlington, VA	
"The Economic Impacts of Antidumping Policy"	1992
Brookings Institution Microeconomics Panel, Washington, DC,	
"Discussion of the Evolution of Industry Structure"	1992
AT&T Conference on Antitrust Essentials	
"Antitrust Standards for Mergers and Joint Ventures"	1991
ABA Institute on The Cutting Edge of Antitrust: Market Power	
"Assessing and Proving Market Power: Barriers to Entry"	1991
Second Annual Workshop of the Competition Law and Policy Institute of New Zealand	
"Merger Analysis, Industrial Organization Theory, and Merger Guidelines"	1991
"Exclusive Dealing and the <u>Fisher & Paykel</u> Case"	1991
Special Seminar of the New Zealand Treasury	
"Strategic Behavior, Antitrust, and The Regulation of Natural Monopoly"	1991

Public Seminar of the Australian Trade Practices Commission "Antitrust Issues of the 1990's"	1991
National Association of Attorneys General Antitrust Seminar "Antitrust Economics"	1991
District of Columbia Bar's 1991 Annual Convention "Administrative and Judicial Trends in Federal Antitrust Enforcement"	1991
ABA Spring Meeting "Antitrust Lessons From the Airline Industry"	1991
Conference on The Transition to a Market Economy - Institutional Aspects "Anti-Monopoly Policies and Institutions"	1991
Conference Board's Thirtieth Antitrust Conference "Antitrust Issues in Today's Economy"	1991
American Association for the Advancement of Science Annual Meeting "Methodologies for Economic Analysis of Mergers"	1991
General Seminar, Johns Hopkins University "Economic Rationales for the Scope of Privatization"	1991
Capitol Economics Speakers Series "Economics of Merger Guidelines"	1991
CRA Conference on Antitrust Issues in Regulated Industries "Enforcement Priorities and Economic Principles"	1990
Pepper Hamilton & Scheetz Anniversary Colloquium "New Developments in Antitrust Economics"	1990
PLI Program on Federal Antitrust Enforcement in the 90's "The Antitrust Agenda of the 90's"	1990
FTC Distinguished Speakers Seminar "The Evolving Merger Guidelines"	1990
The World Bank Speakers Series "The Role of Antitrust Policy in an Open Economy"	1990
Seminar of the Secretary of Commerce and Industrial Development of Mexico "Transitions to a Market Economy"	1990

Southern Economics Association	
"Entry in Antitrust Analysis of Mergers"	1990
"Discussion of Strategic Investment and Timing of Entry"	1990
American Enterprise Institute Conference on Policy Approaches to the Deregulation of Network Industries	
"Discussion of Network Problems and Solutions"	1990
American Enterprise Institute Conference on Innovation, Intellectual Property, and World Competition	
"Law and Economics Framework for Analysis"	1990
Banco Nacional de Desenvolvimento Economico Social Lecture	
"Competition Policy: Harnessing Private Interests for the Public Interest"	1990
Western Economics Association Annual Meetings	
"New Directions in Antitrust from a New Administration"	1990
"New Directions in Merger Enforcement: The View from Washington"	1990
Woodrow Wilson School Alumni Colloquium	
"Microeconomic Policy Analysis and Antitrust--Washington 1990"	1990
Arnold & Porter Lecture Series	
"Advocating Competition"	1991
"Antitrust Enforcement"	1990
ABA Antitrust Section Convention	
"Recent Developments in Market Definition and Merger Analysis"	1990
Federal Bar Association	
"Joint Production Legislation: Competitive Necessity or Cartel Shield?"	1990
Pew Charitable Trusts Conference	
"Economics and National Security"	1990
ABA Antitrust Section Midwinter Council Meeting	
"Fine-tuning the Merger Guidelines"	1990
"The State of the Antitrust Division"	1991
International Telecommunications Society Conference	
"Discussion of the Impact of Telecommunications in the UK"	1989
The Economists of New Jersey Conference	
"Recent Perspectives on Regulation"	1989

Conference on Current Issues Challenging the Regulatory Process	
"Innovative Pricing and Regulatory Reform"	1989
"Competitive Wheeling"	1989
Conference Board: Antitrust Issues in Today's Economy	
"Foreign Trade Issues and Antitrust"	1989
McKinsey & Co. Mini-MBA Conference	
"Economic Analysis of Pricing, Costing, and Strategic Business Behavior"	1989
	1994
Olin Conference on Regulatory Mechanism Design	
"Revolutions in Regulatory Theory and Practice: Exploring The Gap"	1989
University of Dundee Conference on Industrial Organization and Strategic Behavior	
"Mergers in Differentiated Product Industries"	1988
Leif Johanson Lectures at the University of Oslo	
"Normative Issues in Industrial Organization"	1988
Mergers and Competitiveness: Spain Facing the EEC	
"Merger Policy"	1988
"R&D Joint Ventures"	1988
New Dimensions in Pricing Electricity	
"Competitive Pricing and Regulatory Reform"	1988
Program for Integrating Economics and National Security: Second Annual Colloquium	
"Arming Decisions Under Asymmetric Information"	1988
European Association for Research in Industrial Economics	
"U.S. Railroad Deregulation and the Public Interest"	1987
"Economic Rationales for the Scope of Privatization"	1989
"Discussion of Licensing of Innovations"	1990
Annenberg Conference on Rate of Return Regulation in the Presence of Rapid Technical Change	
"Discussion of Regulatory Mechanism Design in the Presence of Research, Innovation, and Spillover Effects"	1987
Special Brookings Papers Meeting	
"Discussion of Empirical Approaches to Strategic Behavior"	1987
"New Merger Guidelines"	1990
Deregulation or Regulation for Telecommunications in the 1990's	
"How Effective are State and Federal Regulations?"	1987

Conference Board Roundtable on Antitrust	
"Research and Production Joint Ventures"	1990
"Intellectual Property and Antitrust"	1987
Current Issues in Telephone Regulation	
"Economic Approaches to Market Dominance: Applicability of Contestable Markets"	1987
Harvard Business School Forum on Telecommunications	
"Regulation of Information Services"	1987
The Fowler Challenge: Deregulation and Competition in The Local Telecommunications Market	
"Why Reinvent the Wheel?"	1986
World Bank Seminar on Frontiers of Economics	
"What Every Economist Should Know About Contestable Markets"	1986
Bell Communications Research Conference on Regulation and Information	
"Fuzzy Regulatory Rules"	1986
Karl Eller Center Forum on Telecommunications	
"The Changing Economic Environment in Telecommunications: Technological Change and Deregulation"	1986
Railroad Accounting Principles Board Colloquium	
"Contestable Market Theory and ICC Regulation"	1986
Canadian Embassy Conference on Current Issues in Canadian -- U.S. Trade and Investment	
"Regulatory Revolution in the Infrastructure Industries"	1985
Eagleton Institute Conference on Telecommunications in Transition	
"Industry in Transition: Economic and Public Policy Overview"	1985
Brown University Citicorp Lecture	
"Logic of Regulation and Deregulation"	1985
Columbia University Communications Research Forum	
"Long Distance Competition Policy"	1985
American Enterprise Institute Public Policy Week	
"The Political Economy of Regulatory Reform"	1984
MIT Communications Forum	
"Deregulation of AT&T Communications"	1984

Bureau of Census Longitudinal Establishment Data File and Diversification Study Conference "Potential Uses of The File"	1984
Federal Bar Association Symposium on Joint Ventures "The Economics of Joint Venture Assessment"	1984
Hoover Institute Conference on Antitrust "Antitrust for High-Technology Industries"	1984
NSF Workshop on Predation and Industrial Targeting "Current Economic Analysis of Predatory Practices"	1983
The Institute for Study of Regulation Symposium: Pricing Electric, Gas, and Telecommunications Services Today and for the Future "Contestability As A Guide for Regulation and Deregulation"	1984
University of Pennsylvania Economics Day Symposium "Contestability and Competition: Guides for Regulation and Deregulation"	1984
Pinhas Sapir Conference on Economic Policy in Theory and Practice "Corporate Governance and Market Structure"	1984
Centre of Planning and Economic Research of Greece "Issues About Industrial Deregulation"	1984
	"Contestability: New Research Agenda" 1984
Hebrew and Tel Aviv Universities Conference on Public Economics "Social Welfare Dominance Extended and Applied to Excise Taxation"	1983
NBER Conference on Industrial Organization and International Trade "Perspectives on Horizontal Mergers in World Markets"	1983
Workshop on Local Access: Strategies for Public Policy "Market Structure and Government Intervention in Access Markets"	1982
NBER Conference on Strategic Behavior and International Trade "Industrial Strategy with Committed Firms: Discussion"	1982
Columbia University Graduate School of Business, Conference on Regulation and New Telecommunication Networks "Local Pricing in a Competitive Environment"	1982
International Economic Association Roundtable Conference on New Developments in the Theory of Market Structure	

"Theory of Contestability"	1982
"Product Dev., Investment, and the Evolution of Market Structures"	1982
N.Y.U. Conference on Competition and World Markets: Law and Economics	
"Competition and Trade Policy--International Predation"	1982
CNRS-ISPE-NBER Conference on the Taxation of Capital	
"Welfare Effects of Investment Under Imperfect Competition"	1982
Internationales Institut für Management und Verwaltung Regulation Conference	
"Welfare, Regulatory Boundaries, and the Sustainability of Oligopolies"	1981
NBER-Kellogg Graduate School of Management Conference on the	
Econometrics of Market Models with Imperfect Competition	
"Discussion of Measurement of Monopoly Behavior: An	
Application to the Cigarette Industry"	1981
The Peterkin Lecture at Rice University	
"Deregulation: Ideology or Logic?"	1981
FTC Seminar on Antitrust Analysis	
"Viewpoints on Horizontal Mergers	1982
"Predation as a Tactical Inducement for Exit"	1980
NBER Conference on Industrial Organization and Public Policy	
"An Economic Definition of Predation"	1980
The Center for Advanced Studies in Managerial Economics Conference on The Economics of	
Telecommunication	
"Pricing Local Service as an Input"	1980
Aspen Institute Conference on the Future of the Postal Service	
"Welfare Economics of Postal Pricing"	1979
Department of Justice Antitrust Seminar	
"The Industry Performance Gradient Index"	1979
Eastern Economic Association Convention	
"The Social Performance of Deregulated Markets for Telecom Services"	
1979	
Industry Workshop Association Convention	
"Customer Equity and Local Measured Service"	1979
Symposium on Ratemaking Problems of Regulated Industries	
"Pricing Decisions and the Regulatory Process"	1979

Woodrow Wilson School Alumni Conference "The Push for Deregulation"	1979
NBER Conference on Industrial Organization "Intertemporal Sustainability"	1979
World Congress of the Econometric Society "Theoretical Industrial Organization"	1980
Institute of Public Utilities Conference on Current Issues in Public Utilities Regulation "Network Access Pricing"	1978
ALI-ABA Conference on the Economics of Antitrust "Predatoriness and Discriminatory Pricing"	1978
AEI Conference on Postal Service Issues "What Can Markets Control?"	1978
University of Virginia Conference on the Economics of Regulation "Public Interest Pricing"	1978
DRI Utility Conference "Marginal Cost Pricing in the Utility Industry: Impact and Analysis"	1978
International Meeting of the Institute of Management Sciences "The Envelope Theorem"	1977
University of Warwick Workshop on Oligopoly "Industry Performance Gradient Indexes"	1977
North American Econometric Society Convention "Intertemporal Sustainability"	1979
"Social Welfare Dominance"	1978
"Economies of Scope, DAIC, and Markets with Joint Production"	1977
Telecommunications Policy Research Conference "Transition to Competitive Markets"	1986
"InterLATA Capacity Growth, Capped NTS Charges and Long Distance Competition"	1985
"Market Power in The Telecommunications Industry"	1984
"FCC Policy on Local Access Pricing"	1983
"Do We Need a Regulatory Safety Net in Telecommunications?"	1982
"Anticompetitive Vertical Conduct"	1981
"Electronic Mail and Postal Pricing"	1980
"Monopoly, Competition and Efficiency": Chairman	1979

"A Common Carrier Research Agenda"	1978
"Empirical Views of Ramsey Optimal Telephone Pricing"	1977
"Recent Research on Regulated Market Structure"	1976
"Some General Equilibrium Views of Optimal Pricing"	1975
National Bureau of Economic Research Conference on Theoretical Industrial Organization	
"Compensating Variation as a Measure of Welfare Change"	1976
Conference on Pricing in Regulated Industries: Theory & Application	
"Ramsey Optimal Pricing of Long Distance Telephone Services"	1977
NBER Conference on Public Regulation	
"Income Distributional Concerns in Regulatory Policy-Making"	1977
Allied Social Science Associations National Convention	
"Merger Guidelines and Economic Theory"	1990
Discussion of "Competitive Rules for Joint Ventures"	1989
"New Schools in Industrial Organization"	1988
"Industry Economic Analysis in the Legal Arena"	1987
"Transportation Deregulation"	1984
Discussion of "Pricing and Costing of Telecommunications Services"	1983
Discussion of "An Exact Welfare Measure"	1982
"Optimal Deregulation of Telephone Services"	1982
"Sector Differentiated Capital Taxes"	1981
"Economies of Scope"	1980
"Social Welfare Dominance"	1980
"The Economic Definition of Predation"	1979
Discussion of "Lifeline Rates, Succor or Snare?"	1979
"Multiproduct Technology and Market Structure"	1978
"The Economic Gradient Method"	1978
"Methods for Public Interest Pricing"	1977
Discussion of "The Welfare Implications of New Financial Instruments"	1976
"Welfare Theory of Concentration Indices"	1976
Discussion of "Developments in Monopolistic Competition Theory"	1976
"Hedonic Price Adjustments"	1975
"Public Good Attributes of Information and its Optimal Pricing"	1975
"Risk Invariance and Ordinally Additive Utility Functions"	1974
"Consumer's Surplus: A Rigorous Cookbook"	1974
University of Chicago Symposium on the Economics of Regulated Public Utilities	
"Optimal Prices for Public Purposes"	1976
American Society for Information Science	
"The Social Value of Information: An Economist's View"	1975
Institute for Mathematical Studies in the Social Sciences Summer Seminar	

"The Sustainability of Natural Monopoly"	1975
U.S.-U.S.S.R. Symposium on Estimating Costs and Benefits of Information Services "The Evaluation of the Economic Benefits of Productive Information"	1975
NYU-Columbia Symposium on Regulated Industries "Ramsey Optimal Public Utility Pricing"	1975

Research Seminars:

Bell Communications Research (2)	University of California, San Diego
Bell Laboratories (numerous)	University of Chicago
Department of Justice (3)	University of Delaware
Electric Power Research Institute	University of Florida
Federal Reserve Board	University of Illinois
Federal Trade Commission (4)	University of Iowa (2)
Mathematica	Universite Laval
Rand	University of Maryland
World Bank (3)	University of Michigan
Carleton University	University of Minnesota
Carnegie-Mellon University	University of Oslo
Columbia University (4)	University of Pennsylvania (3)
Cornell University (2)	University of Toronto
Georgetown University	University of Virginia
Harvard University (2)	University of Wisconsin
Attachment 1 Hebrew University	University of
Wyoming Johns Hopkins University (2)	Vanderbilt
University	
M. I. T. (4)	Yale University (2)
New York University (4)	Princeton University (many)
Northwestern University (2)	Rice University
Norwegian School of Economics and Business Administration	Stanford University (5) S.U.N.Y. Albany

ATTACHMENT 2

**Expert Testimony Provided by Robert D. Willig in the Last Four Years
November 2014**

1. Before the Federal Reserve Bank: Docket Number R-1404: Proposed Rule on Debit Card Interchange Fees and Routing, written statement 2/22/2011.
2. Before the Surface Transportation Board: Docket Number EP 704: Review of Commodity, Boxcar, and TOFC/COFC Exemptions; written statement 1/31/2011; testimony at hearing 2/23-24/2011.
3. New Zealand Commerce Commission vs. Malaysian Airline Systems Berhad, Ltd. and et. al.; High Court of New Zealand: CV 2008-404-8350, Brief of Evidence 4/28/2011, trial testimony 5/20/11 and 5/23-27/2011.
4. Before the Federal Communications Commission: Docket Number 11-65: For Consent to Assign or Transfer Control Licenses and Authorization, written reply statement 6/9/2011.
5. In Re: Checking Account Overdraft Litigation, MDL No. 2036 In the United States District Court for the Southern District of Florida, Miami Division, Case No. 09-MD-02036-JLK, Luquetta v. JPMorgan Chase Bank, Declaration In Support of JP Morgan Chase Bank, N.A.'s Opposition to Class Certification, expert report 6/16/2011.
6. Before the Surface Transportation Board: Docket Number EP 705: Competition in the Rail Industry, written statement 4/12/2011, written reply statement 5/27/2011, testimony at hearing 6/22-23/2011.
7. In the Matter of Rambus Inc. v. Micron Technology, Inc., et al. In the Superior Court of the State of California County of San Francisco, Civil Action No. 04-431105; expert report 11/08/2008; supplemental expert report 12/19/2008, deposition testimony 5/7/2009-5/8/2009, trial testimony 9/1,6,7/2011.
8. In Re McKesson Governmental Entities Average Wholesale Price Litigation, Master File No.: 1:08-CV-10843-PBS; The Board of County Commissioners of Douglas County, Kansas et al. v. McKesson Corp., expert report, April 14, 2010, Response Report, June 28, 2010; Related to Connecticut v. McKesson Corp., expert report, April 14, 2010; Related to Montana v. McKesson Corporation, expert report, November 8, 2010; Related to Oklahoma v. McKesson Corporation, expert report, November 8, 2010; San Francisco Health Plan, et al. v. McKesson Corporation, rebuttal expert report, 9/19/2011.
9. Before the Public Service Commission of Maryland, Case No.: 9271, In the Matter of the Merger of Exelon Corp. and Constellation Energy Group, Inc., written market power rebuttal testimony, 10/17/2011, written surrebuttal testimony 10/26/2011, hearing testimony, 11/2011.

10. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, DELL Inc., *et al.*, v. SHARP Corporation, *et al.*, Case No. 3:10-cv-01064 SI MDL No. 3:07-md-1827-SI, expert report 2/23/2012, deposition 4/18/2012.
11. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, Motorola Mobility Inc. v. SHARP Corporation, *et al.*, Case No. 3:09-cv-05840 SI MDL No. 3:07-md-1827-SI, expert report 2/23/2012, deposition 4/18/2012.
12. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, AT&T Mobility Inc. v. SHARP Corporation, *et al.*, Case No. 09-cv-4997 SI MDL No. 07-m-1827-SI, expert report 2/27/2012, deposition 4/18/2012.
13. In Re TFT-LCD (Flat Panel) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, BEST BUY CO., Inc., *et al.*, v. AU OPTRONICS CORP., *et al.*, Case No. 10-cv-4572 SI MDL No. 07-md-1827-SI, expert report 3/5/2012, deposition 4/18/2012.
14. Clark R. Huffman and Brandi K. Winters, individually and on behalf of all others similarly situated vs. PRUDENTIAL INSURANCE COMPANY of AMERICA, In the United States District Court for the Eastern District of Pennsylvania, Civ. No. 2:10-cv-05135-EL, declaration 4/10/2012.
15. In re Prudential Insurance Company of America SGLI/VGLI Contract Litigation, CLASS ACTION, Master Case No. 3:11-md-02208-MAP, In the United States District Court for the District of Massachusetts, declaration 5/10/2012.
16. Australian Competition and Consumer Commission v. Singapore Airlines Cargo PTE LTD *et al.*, Before the Federal Court of Australia, District Registry: New South Wales, Division: General, No. NSD 1980 of 2008, NSD 363 of 2009, NSD 876 of 2009 and NSD 1213 of 2009, affidavit and expert report 7/12/2012.
17. Bandspeed, Inc. v. Sony Electronics, Inc. *et al.* and Cambridge Silicon Radio Limited, Cause No. A-11-CV-771-LY, In the United States District Court for the Western District of Texas, Austin Division, expert reports 9/21/2012, 8/01/2013, and 11/01/2013, declaration 11/19/2013, deposition 1/10/2014.
18. M&G Polymers USA, LLC v. CSX Transportation, Inc., Before the Surface Transportation Board, Docket Number NOR 42123, verified statement 11/27/2012.
19. National Collegiate Athletic Association *et al.*, Plaintiffs, v. Christopher J. Christie *et al.*, Defendants, In the United States District Court for the District

of New Jersey, Civil Action No. 3:12-cv-04947 (MAS) (LHG), expert report 11/21/2012, deposition 11/30/2012.

20. In Re Cathode Ray Tube (CRT) Antitrust Litigation, In the United States District Court Northern District of California San Francisco Division, Master File No. CV-07-5944-SC MDL No. 1917, expert report 12/17/2012, deposition 1/24/2012, declaration 3/25/2013, expert report 9/11/2013.
21. In Re Titanium Dioxide Antitrust Litigation, In the United States District Court of Maryland Northern Division, Case No. 1:10-cv-00318-RDB, expert report 12/21/2012, deposition testimony 2/7-8/2013.
22. PPL EnergyPlus, LLC, et al., v. Douglas R.M. Nazarian, in his official capacity as Chairman of the Maryland Public Service Commission, et al., In the United States District Court of Maryland Northern Division, Case No. 1:12-cv-01286-MJG, expert report 12/21/2012, supplemental expert report 2/1/2013, deposition testimony 2/14/2013, trial testimony 3/8/2013.
23. PPL EnergyPlus, LLC, et al., v. Robert Hanna (originally, Lee A. Solomon), in his official capacity as President of the New Jersey Board of Public Utilities, et al., In the United States District Court for the District of New Jersey, Case No. 3:11-cv-00745-PGS-DEA, expert report 2/6/2013, deposition 2/14/2013 and 2/21/2013, and trial testimony 4/9-10/2013.
24. Total Petrochemicals & Refining USA, Inc. v. CSX Transportation, Inc., Before the Surface Transportation Board, Docket Number NOR 42121, verified statement, 6/20/2013.
25. Australian Taxation Office - Rio Tinto Limited transfer pricing rules mediation matter, Expert Reports: 11/14/2013; 11/24/2013; 5/15/2014; and 8/29/2014.
26. GSI Technology, Inc. v. Cypress Semiconductor Corporation, United States District Court, Northern District of California, Case No. 5:11-cv-03613-EJD, expert report 3/28/2014, reply report 5/8/2014, deposition 5/29/2014.
27. In re: Cathode Ray Tube (CRT) Antitrust Litigation, In the United States District Court for the Northern District of California, San Francisco Division, MDL Docket No. 1917, Master File No. CV-07-5944-SC, expert report 8/5/2014; deposition 9/19/2014.
28. Amazon.com, Inc. v. Commissioner of the Internal Revenue Service, Tax Court Docket No. 31197-12, expert reports 6/6/2104 and 8/1/2014; deposition 9/11/2014.
29. Commonwealth of Massachusetts v. Partners Health Care System, et al., Suffolk Superior Court Civil Action No. 14-2033-BLS, affidavit 9/25/2014.

ATTACHMENT 3

Attachment 3: Materials Relied Upon

Legal Filings

Indirect Purchaser Plaintiffs' Fourth Consolidated Amended Complaint, January 10, 2013

Expert Materials

Declaration of Janet S. Netz, Ph.D., in Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, October 1, 2012, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Expert Report of Robert D. Willig, Indirect Purchaser Class Action, December 17, 2012, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Rebuttal Declaration of Janet S. Netz, Ph.D., in Support of Motion of Indirect-Purchaser Plaintiffs for Class Certification, February 15, 2013, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Declaration of Janet S. Netz, Ph.D., in Support of Indirect-Purchaser Plaintiffs' Opposition to Defendants' Motion to Strike the Proposed Expert Testimony of Dr. Janet S. Netz, February 15, 2013, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Rebuttal Declaration of Robert D. Willig, Indirect Purchaser Class Action, March 25, 2013, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Expert Report of Robert D. Willig, Direct Purchaser Class Action, September 10, 2013, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Expert Report of Robert D. Willig, August 5, 2014, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Errata to the Expert Report of Robert D. Willig, September 10, 2014, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Errata to the Expert Report of Robert D. Willig, September 23, 2014, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Expert Report and Backup of Janet S. Netz, Ph.D., April 15, 2014, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Errata to the Expert Report of Janet S. Netz, Ph. D., July 3, 2014, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Expert Rebuttal Report and Backup of Janet S. Netz, Ph.D., September 26, 2014, In re: Cathode Ray Tube (CRT) Antitrust Litigation (United States District Court Northern District of California San Francisco Division)

Depositions and Exhibits

de Moor, Roger (PENAC), Volume I, July 31, 2012

de Moor, Roger (PENAC), Volume II, August 1, 2012

Heinecke, Jay (TAEC), July 31, 2012

Iwasawa, Toru (Hitachi), July 11, 2012

Kurosawa, Koji (Toshiba), July 30, 2012

Lee, Jaein (SDI), Volume I, June 6, 2012

Lee, Jaein (SDI), Volume II, June 7, 2012

Nakano, Takashi (PNA, MTPD), July 13, 2012

Netz, Ph.D., Janet (Expert), November 15, 2012

Netz, Ph.D., Janet (Expert), March 15, 2013

Netz, Ph.D., Janet (Expert), June 27, 2014

Netz, Ph.D., Janet (Expert), October 31, 2014

Park, Sang-Kyu (SDI), Volume III, March 22, 2013

Son, Michael (SDI), Volume I, February 5, 2013

Son, Michael (SDI), Volume II, February 6, 2013

Tobinaga, Tatsuo (MTPD), Volume I, July 16, 2012

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Uchiyama, Yoshiaki (TACP), August 1, 2012

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Public Documents

CFR 2011, Title 16, Volume 1, Part 410

International Labour Organization, *Consumer Price Index Manual: Theory and Practice*, 2004

StataCorp, *Stata Longitudinal-Data/Panel-Data Reference Manual*, College Station, TX: Stata Press., 2013, available at: <http://www.stata.com/manuals13/xt.pdf>

United States Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines*, 2010

United States International Trade Commission, *Color Picture Tubes from Canada, Japan, Korea, and Singapore, Investigations Nos. 731-TA-367-370 (Review), Determinations and Views of the Commission*, USITC Publication No 3291, 2000

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ABA Section of Antitrust Law, “Proving Antitrust Damages: Legal and Economic Issues,” Second Edition, 2010

Bali, S. P., *Colour Television: Theory and Practice*, Delhi: Tata McGraw-Hill Publishing Company Limited, 1994, p. 83

Cabral, Luis, *Introduction to Industrial Organization*, Cambridge: The MIT Press, 2000

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Stock, J.H., and Watson, M.W., *Introduction to Econometrics*, Third Edition, Addison-Wesley, 2011

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Fredenburgh, Catherine, “U.S. Unit of LG.Philips Files for Chapter 11,” *Law360*, March 16, 2006, available at <http://www.law360.com/articles/5730/u-s-unit-of-lg-philips-files-for-chapter-11>, accessed November 6, 2014

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“Corning Asahi Expanding Glass, Adding 35”, *Consumer Electronics*, July 10, 1995

Other Documents

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2009-04-20 - Investigation of the Causes of the Bankruptcy of LG Philips Displays

Chunghwa Picture Tubes_2003 Consolidated Financial Statements.pdf

Chunghwa Picture Tubes_2004 Consolidated Financial Statements.pdf

Chunghwa Picture Tubes_2005 Consolidated Financial Statements.pdf

Chunghwa Picture Tubes_2006 Consolidated Financial Statements.pdf

CPT_AR_1990.pdf

CPT_AR_1996.pdf

CPT_AR_2002.pdf

CPT_AR_1991.pdf

CPT_AR_1997.pdf

CPT_AR_2008_cn.pdf

CPT_AR_1992.pdf

CPT_AR_1998.pdf

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CPT_AR_1993.pdf

CPT_AR_1999.pdf

CPT_AR_2008_eng.pdf

CPT_AR_1994.pdf

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Data

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Data and Programs Relied Upon by Janet S. Netz, Ph.D.

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MTPD-0426088E	PHLP-CRT-049353	SDCRT-0086641
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